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# Relocation of earthquakes in the Labrador Sea and southern Labrador

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# RELOCATION OF EARTHQUAKES IN THE LABRADOR SEA AND SOUTHERN LABRADOR


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# ABSTRACT

Ninety-eight earthquakes in Labrador and the Labrador Sea have been systematically relocated. Their revised locations show a good correlation between seismicity and geological structures. Most of the earthquakes occur on three structures: the extinct spreading ridge and associated transform faults in the Labrador Sea; the rifted continental margin off Labrador and the transform continental margin southeast of Baffin Island; and a zone of crustal weakness extending from Sept-Iles across southern Labrador to the Cartwright Fracture Zone.

# RESUME

Quatre-vingt-dix-huit tremblements de terre du Labrador et de la mer du Labrador furent systématiquement relocalisés. Les nouvelles localisations montrent une bonne corrélation entre la séismicité et les structures géologiques. La majorité des séismes se produisent sur trois structures: sur les rides d'extensions inactives et leurs failles transformantes associées dans la mer du Labrador, sur le plateau continental effondré au large du Labrador et sur le plateau continental transformant au sud-est de l'île de Baffin, et finalement, sur une zone de faiblesse de la croûte qui s'étend de Sept-Iles à la zone de fracture de Cartwright en passant par le sud du Labrador.

# INTRODUCTION

Earthquakes were felt in coastal Labrador as early as the 1800's (Staveley and Adams, 1985), but only since the establishment of seismograph arrays beginning in the 1960's has it been possible to detect numerous small Labrador earthquakes. Nearly one hundred earthquakes in the Labrador Sea and onshore Labrador have been recorded by seismographs over the last fifty years. We have studied the locations of the Labrador earthquakes prior to 1988 to determine their epicentres as precisely as possible, so as to determine any trends in their distribution and to relate them to the geological structure in the Labrador Sea.

We have considered it to be important to locate all earthquakes in the same way, so that their epicentres can be compared directly. This was done by recomputing epicentres from the available phase readings, changing the relative importance of readings used in locating the epicentre, re-reading some of the earthquake phases on the original seismograms to check old data, obtaining new readings from previously unread stations, and adding new data from national and international compilations of seismic information.

The earthquakes in the study have been divided into four groups (Fig. 1), based on geographical clustering:

| Area | no. of earthquakes |
|---|---|
| **A** Labrador Ridge | 55 |
| **B** Southeast Baffin Shelf | 9 |
| **C** Labrador Shelf | 20 |
| **D** Southern Labrador - Eastern Quebec | 14 |

# EARTHQUAKE MONITORING OF THE LABRADOR SEA

Earthquakes have been felt and reported in Canada since the sixteenth century. The first continuously recording seismograph went into operation in Toronto in 1897, (Stevens, 1980) but most early seismographs were not able to record local earthquakes very well, and up to 1927 most of our knowledge of early Canadian earthquakes comes from accounts in newspapers, scientific reports, and diaries. Improvements began in 1928 when two seismographs suitable for recording local earthquakes were installed at Seven Falls and Shawinigan Falls, Quebec. In the period 1937 - 1957, five short period seismographs operated in eastern Canada, (OTT, SFA, SHF, KLC, HAL - station codes are given in Appendix A) with a magnification of at least 2000x, although there has been only the one northern station at Resolute since 1950 (Stevens, 1980). None were in Labrador, or close to the Labrador Sea, so Labrador earthquakes from this period lack data from close stations and many small earthquakes were probably missed.

In 1958, the government began to expand the Canadian seismic network with the goal that no point in Canada would be further than 500 km from a station and that all stations would be equipped with the best instruments (Smith, 1967). Since the completion of the Canadian Standard Station Network in the mid 1960's, this uniform coverage has been supplemented in southern Canada so that at present there are now more than one hundred seismograph stations, recording national and global earthquakes (Munro et al., 1985). The standard station network (chiefly because of stations Schefferville – SCH, established in 1962 – and Frobisher Bay – FBC and then FRB, 1963), resulted in a large increase in the number of recorded earthquakes in the Labrador Sea, easily seen by the fact that almost all of the earthquakes relocated in this study occurred after 1960 (Fig. 2).

The uppermost solid line on Figure 2 is the detection threshold for a Labrador Ridge site (60.9° N, 58.6° W), showing the smallest magnitude that is likely to be detected (2 mm amplitude at 0.3 sec) on the most sensitive seismograph in operation at the time. Since 1963 this has been FRB which has a magnification of 141 000.

The previous most sensitive seismographs, from newest to oldest, and from best to worst had been SCH, OTT, and SFA, so the detection threshold line steps down to the right. The lower solid line represents the detection threshold for a representative Labrador Shelf site (57.4° N, 58.7° W), found from stations SCH, OTT, and SFA, in the same order.

## Earthquake Completeness Thresholds for Labrador Sea Earthquakes

The down-stepping lines on Figure 2 shows one measure of detection ability. However for an earthquake to be detected, confirmed, located, and placed into the Canadian Earthquake Epicentre File (CEEF), it is normally necessary for it to be well recorded on two stations so that weak confirming phases can be found on a few other stations. An estimate of the completeness of the earthquake catalogue for the period 1963 to 1977 was therefore made by calculating, at a number of grid points in the Labrador Sea, the $M_L$ magnitudes that would have been produced for waves of amplitude 2.0 mm zero-to-peak at a period 0.3 seconds, for stations FRB, SCH, and STJ, using each station's respective magnification. These are the smallest waves that are unlikely to have been missed on a seismogram. For each grid point, the *second smallest* magnitude from the three stations was adopted as a realistic estimate of earthquake completeness. Contour lines show the outer limits to which earthquakes of a certain magnitude could be detected (Fig. 3). The magnitudes increase quite clearly away from each of the three stations, with the poorest, STJ, having the most rapid decline. Completeness of Labrador Ridge events is strongly controlled by their distance from FRB, confirming that station distance could account for the apparent decline in activity to the southeast along the Labrador Ridge (Fig. 1).

The completeness thresholds from 1977 to the present were found in a similiar way using the stations FRB, SCH, MNQ, JAQ, CBK, and MUN (Fig. 4). These contours are parallel to the coast and the magnitudes increase uniformly offshore, suggesting that the coverage is mainly constrained by the geography. Placing a station on the Labrador coast or on the south tip of Greenland would

decrease the completeness threshold. In the short term, improved reporting of "dubious" phases at GDH and cross-checking these with the SCH and FRB records might lower the threshold in the northern Labrador Sea.

### Earthquake Magnitudes Used

Earthquake magnitude is a measure of the "size" or the energy of an earthquake, and is determined using one-half the maximum peak-to-peak trace amplitude (A), the period of the trace at the maximum (T), the magnification in 1000s (K), and the distance of the seismograph from the epicentre (D). Several scales are used, depending chiefly on the size and location of the event (Drysdale et al., 1988). The two common scales for Labrador earthquakes are:

1) Richter Scale - Developed by Charles Richter for California earthquakes, it is used to determine the magnitude of earthquakes by the equation:

$$M_L = Log_{10}((A^*K_W)/K) - Log_{10}A_0(D)$$

where $K_W$ is the magnification of a Wood-Anderson seismograph at period T and $Log_{10}A_0$(D) is a calibration function defined by Richter (1958). Richter's equation is routinely used without distance restriction to determine the magnitude of Canadian earthquakes offshore of the continental slope, where Lg is absent. The amplitude, (A), is read on the Sn phase, which is the largest amplitude S phase on the record.

2) Nuttli Scale - this scale utilizes the amplitudes of Lg waves, and uses the equation:

$$m_N = -0.1 + 1.66 * Log_{10} D + Log_{10}(A/(K*T))$$

While $m_N$ is used for almost all onshore and shelf earthquakes, the Lg waves from some earthquakes on the continental shelf may be strongly attenuated. $M_L$ is used for those earthquakes for which the Lg appear to have been attenuated and when (Amp. Sn) > (Amp. Lg).

In addition, two other scales are used to determine magnitudes of Labrador earthquakes from distant stations.

3) $m_b$ scale - this uses the amplitude of teleseismic P-waves with a period of 1 to 10 seconds, recorded on short period seismographs at distances over 3000 km, and is generally used for earthquakes of magnitude 4.5 to 6.5. $m_b$ magnitudes are the preferred magnitude when they are well defined.

4) $M_S$ scale - this uses the amplitudes of surface waves with a period of 15 to 30 seconds, recorded on long period seismographs, and is generally used for earthquakes of magnitude 6 and larger.

# RELOCATING THE LABRADOR EARTHQUAKES

## General Proceedures

The basic principle behind locating earthquakes lies in using the time differences between the arrival of known phases. In past years, travel-time charts showing the distance traveled vs. time taken by different phases, were used to find the distance of the station from the epicentre. The difference between arrival times of two different phases, often Pn and Sn, is fitted onto the appropriate curves, and the distance is found from the chart. For example, if the Sn phase is one minute behind the Pn phase, the distance to the station is 600 km. Knowing the distance also gives the origin time.

When readings are available from three or more stations, the original method of locating the epicentre was to draw on a map arcs centred on the stations, with the calculated distances as radii. Their intersection point was the epicentre (Smith, 1967). This was done by hand until the late 1960's, but now computer programs have been written to determine the epicentre and origin time that best fit the data simultaneously. If only two stations are available, as for some old earthquakes, there are two possible "intersection points", and a decision must be made as to which is probably correct.

Depth estimates are difficult to obtain for local earthquakes unless they occur close to a seismograph. Generally, events in eastern Canada occur between 5 to 25 km deep, and are often assigned to 18 km, half of the crustal thickness (Smith, 1967). On the Labrador ridge, the crust is thinner and so the earthquakes may be occurring at shallower depths, perhaps 0 - 10 km.

Earthquakes used to be located by performing calculations and plots by hand, and earlier epicentres reflect the imprecision of this method. Currently, the Geophysics Division uses the program "LOC" written in 1971 by Mr. R. J. Wetmiller, together with a "pikfile" data format (described in detail in Appendix B) to locate epicentres and determine magnitudes. The arrival times are weighted according to quality, by flagging them with an A, B, C, or X; A gives the greatest weight, while X causes the reading to be ignored for locating the epicentre.

### Sources of Earthquake Phase Information for Labrador Earthquakes

Data for the oldest events, from 1900 to 1960, were recorded on hand-written cards, with phase and magnitude information, along with notes from whomsoever took the readings. Many of these earlier events had been relocated by Mr. W. E. T. Smith who re-read the original records where possible and annoted the cards with red pencil during production of his catalogues (Adams et al., 1989). Smith's phase readings are highly regarded. He did his work by hand, so his epicentres might be less precise than ones derived from computer models, and were often given to the closest 1/2 or 1/4 degree. These older earthquakes often lacked adequate data because of the small number of operating stations. Some of the old records were mounted in a scrapbook, which was consulted on a few occasions to check arrival times for this study.

In 1961 a computer program was written to calculate the distance of a station from the epicentre using the differences in phase arrival times; however, arcs were still drawn to locate the epicentre. The phase and magnitude data for events from 1961 to 1977 are stored on punched computer cards.

From 1978 onward, the phase information was obtained from the Canadian Earthquake Database, which is maintained and updated regularly by the Geophysics Division of the Geological Survey of Canada, and from the National Bulletin of Canadian Earthquakes, published by the late Earth Physics Branch of Energy, Mines, and Resources and now by the Geological Survey of Canada. Phases for many of the more recent earthquakes were read from digital seismograph records, allowing more accurate phase readings.

Additional phase information was obtained from the International Seismological Summary (ISS), which records and locates earthquakes based on readings from stations around the world. From this source, Greenland stations were added. Other international summaries used were from the Bureau Central de l'Association Internationale de Seismologie (BCIS) and the U.S. Coast and Geodetic Survey (USCGS).

### Re-examination of Seismograms

For some of the earthquakes after 1985, it was appropriate to re-examine the existing seismograms to attempt to clarify arrival times. The task of fully re-reading the phases for these Labrador earthquakes from the original records would roughly equal the entire work done for this report and was not considered justified given the general care with which the seismograms have normally been read. New phases added were from seismograms from Corner Brook and St. John's. These seismographs are operated by Memorial University of Newfoundland. They began recording in 1975 and 1977 respectively, and their seismograms are temporarily stored at the Geophysics Division. A systematic examination of CBK and MUN records by Adams in 1983 detected three earthquakes in the study area that had been missed by the Canadian Standard Network (see Tables 1 and 4).

Some seismograms had inaccurate timing. Fluctuations in the rotational speed of the recording drums cause the time scale on the record to vary, and the timing clocks, especially those used on older records, were not always completely accurate (Adams et al., 1989).

In some cases, time corrections were noted on the records, which were used to correct the phase arrival times read on the record. In other cases (often for SFA and CBK), inaccurate timing was suspected, but no time corrections were available. In order to use the distance information contained in the time difference between Pn and Sn arrivals an arbitary time correction was sometimes assumed.

## Specific Techniques used for Relocating the Labrador Earthquakes

For locating both on and offshore Labrador earthquakes, several standards were applied to the data. The intention was to locate all the earthquakes consistently and to relatively high *precision*. It is recognized that the methods used here may introduce some bias in the epicentral *accuracy*, but that more advanced methods (master event or joint epicentre determination) could later be applied to the consistent data set. It is unlikely that the revised epicentres for the larger, modern events are more accurate that ±20 km, and the accuracy of the older and/or poorly recorded events, even when revised, may be considerably worse.

- The Pn and Sn readings from Frobisher and Schefferville were given A weights, except when they had been noted as poorly recorded or had very large residuals inconsistant with other stations. These two stations were usually the closest to the events, and so their data were considered the most important in locating the epicentre. Also, their azimuths from the epicentre usually formed an approximate 90 degree angle, so, by analogy, when their arcs were calculated, a clear intersection point in the Labrador Sea would be given. One or both of these stations recorded almost every event since the early 1960's.

- Earthquake depths were fixed at 18 km deep, half the thickness of the crust in eastern Canada.

- Phases for stations at distances of more than 4000 km were not used.

- Lg phases were used for the Labrador onshore earthquakes, using the revised velocity of 3.65 km/s derived for the Canadian Shield in Ontario (Wetmiller and Cajka, 1989). Subsequent work (Connors and Adams, 1989) suggests a velocity of 3.62 km/s may be more appropriate.

- The Lg phases were not used to locate the Labrador Ridge and Shelf events, as Lg is usually absent for Ridge events, and is attenuated for Shelf events. Also, the exact velocity of the Lg phase is uncertain near the eastern margin. Where Lg phases had been read, it was attempted to obtain low residuals for them, by using one of the two different Lg velocities, the old standard of 3.57 km/s, and the revised one of 3.65 km/s, according to which produced the lowest residuals. Because the Lg phase was not used for the epicentre calculations, the apparant arbitary nature of this choice does not affect the computed epicentres. At some later stage, the geographical pattern of the assigned velocities should be investigated.

- Amplitude readings from Halifax were not used for the $M_N$ magnitude calculations, as Lg waves apparently attenuate faster than normal travelling under the Gulf of St. Lawrence, producing abnormally low magnitudes at Halifax.

- In a few cases when both Pn and Sn phases for the same station had large residuals of approximately the same amount, it was assumed that a time correction was needed. An arbitary time correction was added to reduce the residuals to a small value. This was done particularly for stations with known timing problems, such as SFA and CBK.

- Some arrival times had been assigned to the wrong phase. For example, a reading was interpretated to be a Lg, when in fact it was an Sn. Such gross errors were easily detected.

- For some events with many stations and phase readings in one quadrant, it was difficult to obtain an epicentre without large residuals on the closest stations. A scratch file containing the readings from the three or four closest stations representing a good range of azimuths was formed, and the location obtained from this data was adopted.

- Events with few phases sometimes could not be located initially by LOC, so the epicentre and arrival time was fixed to the CEEF calculated values, to force the event to locate in the correct area. Then, the event was allowed to freely locate, using the original location as the basis of the relocation.

- If an event had data from only two stations, LOC was not able to choose the correct epicentre from the two possible intersection points. Adding a third station (without any data) close to the chosen intersection point forced the program to locate the epicentre in the chosen area.

# RESULTS OF RELOCATION STUDY

Ninety-eight earthquakes were relocated in this study, located in the four geographical groups identified on Figure 1. The original CEEF epicentres of the earthquakes are shown on Figure 5. The epicentres outside the polygon were not relocated in this study. Figure 6 shows the displacement vectors between the old and new locations, and Figure 7 shows the revised epicentres derived.

Earthquakes in each of the four groups in this report are dealt with separately below. In each discussion, the earthquakes are identified by a six-figure number composed of the year, month, and day of the earthquake. For example, 850417 refers to the earthquake which occurred on the 17th of April, 1985. Detailed comments on each relocation can be found in its appropriate pikfile in Appendix C.

### A. Labrador Ridge Earthquakes

Table 1 (collected with other tables at the end of the report) summarizes the relocations made, and Figures 8 and 9 show the old and new positions of the earthquakes, connected by a displacement vector. The first part of Appendix C contains the pikfile for each event, with detailed comments on the phases and the solution.

Attention is drawn to the eleven events which move more than 100 km from their original position. The large shift for the first such earthquake, 580204, can be attributed to the addition of two Greenland stations (from the notes of S. Gregersen), and additional phases from BCIS.

Event 620803 has the largest change of all (1100 km), but both the original and revised locations are based on only three phases for two stations, and additional stations from Greenland and the Northwest Territories are needed to confirm its revised location. A western epicentre was ruled out by Smith because the earthquake was not detected on southern stations, so he located it on the southern Labrador Shelf. After examining the HAL seismogram and confirming that only one phase was recored, we have followed Wahlstrom's unpublished work and have re-interpreted Smith's Sn reading for Halifax as the Pn phase. This, together with the absence of Lg at Schefferville, is consistant with an oceanic event on the Labrador Ridge. A slightly larger Ridge event, 621202, near the revised 620803 also lacks a Sn reading for HAL.

The Mould Bay reading in event 621026 was considered to be too late and was removed from the location calculations.

Events 621202, 640222, and 650222 have readings from only three, two, and two stations respectively, giving little data to work with. Despite the large size of their relocations, they may still not be very accurately located.

Event 680416 had its Frobisher Pn changed to a Pg phase, which reduced the residuals on the Sn phases on the other three stations. Lg is seen for this earthquake so that it seems possible that the Pg could have been read, and a weak Pn missed.

Event 791023 has a large change partly because the event was apparently not detected by the local Canadian stations. The original location was determined by ISC, but was in considerable error because it was found without using any local phases. Local Canadian stations and the Corner Brook readings were added to improve the epicentre.

Changes on the rest of the earthquakes are smaller, and Appendix C should be consulted for detailed comments on their relocation. Although the earthquakes seem to move randomly from their old epicentres to their relocated ones, they did concentrate along the northwest-to-southeast trend because outlying events moved in slightly.

### B. Southeast Baffin Shelf Earthquakes

Table 2 contains the relocation data on each of these earthquakes, and Figure 10 shows their displacements. The pikfiles are given in the second part of Appendix C. Only event 800706 moved over 100 km, and it is considered poorly relocated because only four phases are recorded on only two stations.

Three earthquakes occur on 710814 at two minutes intervals. The first and last had the same original location, and their revised locations remain identical, but only three phases were recorded from each. On Figure 10, the two earthquakes are plotted together and the triangle marked "2" represents both events. The middle earthquake, which was the largest in magnitude and had four phases recorded, located close by.

## C. Labrador Shelf Earthquakes

Relocations for Labrador Shelf earthquakes are listed in Table 3, mapped on Figure 11, and their pikfiles are given in the third part of Appendix C. There is little systematic pattern to their movements, though the large cluster has concentrated into a horseshoe-shape. Also, the two northernmost events 671227 and 771105 have moved closer together.

Only one earthquake, 521020, moves more than 100 km, because of added data from ISC and the Ottawa Station Bulletin.

Event 630312 is considered poorly located, since all three recording stations are located southwest of it, within a 37 degree azimuth. Any errors in the phase velocity model used would not be balanced by other stations on different azimuths.

The time correction is assumed on Corner Brook in 790404, due to the known poor timing at the station.

The earthquake and aftershock on 860108 locate very close to one another, with a difference of only approximately 9 km. Conventional wisdom would suggest that they occurred at the same place, so the difference probably reflects the difficulty of reading the weaker phases from the aftershock.

Figure 12 shows the same earthquakes as Figure 10, but with the addition of diamonds showing the computed precision of the epicentre. As can be seen, for many earthquakes the diamond is the same size, or smaller, than the earthquake symbol. For four earthquakes, the diamonds are 2 – 3 times larger than the plotting symbol. The more poorly located earthquakes on the figure (and indeed those derived from the whole study) can be identified by inspection of the PIK files in Appendix C. From Figure 12 it appears that the errors associated with each epicentre are small with respect to the distance between epicentres, and that the "horseshoe" pattern in the centre of the figure is clearly defined.

## D. Southern Labrador - Eastern Quebec Earthquakes

Table 4 summarizes the relocation of earthquakes in the trend which extends across southern Labrador into easternmost Quebec (the "north shore") near Sept-Iles, Figure 13 shows the displacement from their original positions, and their pikfiles are found in the last part of Appendix C. Little systematic pattern exists in their movement and there are only three earthquakes which move significantly. The first, 631025, has only four recorded phases on two stations. Eastern Quebec was chosen by Smith as the site over a western location because it was not recorded at Seven Falls. Because the magnitude is only 2.9 $m_N$, it is unlikely to have been recorded elsewhere.

Event 790105, had the Pn phases on three stations, Sept-Iles, St. John's and Schefferville changed to Pg phases and Corner Brook had a one second time correction applied to it. However, all the phases are dubious, so the solution is unsatisfactory.

Event 821003 had three phases added from re-reading the original seismograms. Corner Brook was not operating and the Memorial University record was too noisy, so no data from these stations are available.

Almost half of these earthquakes have records from only 2 or 3 stations, which limits the accuracy to which they can be located. The detection and location of earthquakes in this area is still very poor as there is as yet no seismograph in the Straits of Belle Isle – Groswater Bay area.

# RESULTS OF RECOMPUTATIONS OF MAGNITUDES

Relocation of the Labrador earthquakes produced some large changes in magnitude, particularly when re-examination of the observed phases led to a different choice for the magnitude scale (e.g. Ridge earthquake 710112). Smaller changes sometimes resulted from the addition of new amplitude data from additional stations, or the re-reading of phase amplitudes and periods on seismograms.

For Southeast Baffin Shelf and Labrador Shelf earthquakes, the strength of the phase Lg relative to the Sn varies greatly. The magnitudes were in some cases revised from $m_N$ to $M_L$ or vice-versa. Unfortunately, the time at which the largest amplitude is read is not routinely noted, so it is impossible to determine retrospectively whether the amplitude was read on the Lg, the Sn, or on an attenuated Lg phase. If the former, $m_N$ is the appropriate measure, but in the last case, it would be more appropriate to determine $M_L$ from the Sn, and not $M_L$ or $m_N$ from the attenuated Lg. A slight overestimate of magnitude may therefore occur for those earthquakes where we have computed $M_L$ even though a time for the onset of the Lg phase has been read.

For Ridge earthquakes, it was noted that station FRB (and station FBC before it) gives magnitudes that are usually much lower than the average values. The reason for this discrepancy is not yet known.

## Comparison of $m_b$ and $M_L$ for Labrador Sea Earthquakes

For nine large earthquakes in the Labrador Sea, both $m_b$ and $M_L$ magnitudes were available. The $m_b$ readings were usually taken from ISC, while the $M_L$ were calculated in this report and are given below:

Comparison of $m_b$ and $M_L$ for Labrador Sea Earthquakes

| Date of event | $m_b$ | no. of obs. | $M_L$ | no. of obs |
|---|---|---|---|---|
| 650810 | 4.2 | 7 | 4.8 | 4 |
| 690723 | 4.1 | 4 | 4.6 | 4 |
| 691124 | 4.9 | 22 | 5.4 | 11 |
| 731012 | 4.2 | 6 | 4.9 | 11 |
| 751213 | 4.4 | 6 | 4.5 | ? |
| 791023 | 4.6 | 5 | 4.5 | 8 |
| 810406 | 4.9 | 35 | 5.0 | 11 |
| 810824 | 4.8 | 28 | 5.2 | 13 |
| 830212 | 4.4 | 2 | 5.0 | 6 |
| Mean | 4.50 | | 4.88 | |

Figure 14 compares $m_b$ with $M_L$ for the 9 earthquakes. Assuming the relationship between the two magnitudes is linear with slope of 1.0, the bias is 0.38 magnitude units with the $m_b$ related to the $M_L$ by the equation:

$$m_b = M_L - 0.38 \text{ (for } 4.0 < m_b < 5.0)$$

A full comparison of $M_L$ and $m_b$ needs more work as we have too few earthquakes to propose this relationship with much confidence. A full analysis of Sn attenuation is needed in order to replace Richter's California-derived coefficients with empirical ones derived for the eastern Canadian margin. Such an analysis could involve reading both Sn and Lg amplitudes for shield events in order to derive Sn attenuation coefficients and/or a $M_L$ - $m_N$ relationship for the Shield, or improving the $M_L$ - $m_b$ relationship by studing other offshore earthquakes (such as those in Baffin Bay or the Beaufort Sea), for which $m_b$ has been derived and $M_L$ calculated from the Sn amplitudes.

This report has computed and used $M_L$ for consistency and the revisions to the CEEF (Tables 1 - 4) reflect this. For the few earthquakes for which there are good estimates of $m_b$, $m_b$ is still the preferred magnitude. Future study along the lines described above will be needed so that the CEEF magnitudes can be adjusted and then used in a consistent way with other Canadian earthquakes.

# IMPLICATIONS OF THIS STUDY FOR THE ORIGIN OF LABRADOR EARTHQUAKES

The Labrador Ridge earthquakes are associated with an extinct spreading ridge where oceanic crust was once created during the opening of the Labrador Sea between 80 and 45 million years ago (Fig. 15). The extinct Labrador spreading ridge, (together with fracture zones perpendicular to the ridge, marking extinct transform faults) are currently zones of weakness that are being reactivated by stresses created by contemporary sea-floor spreading at the Mid-Atlantic Ridge (Adams and Basham, 1989). The apparent decline in numbers of earthquakes southeastwards along the ridge is most likely due to the increasing distance for station FRB, as determined in the section on completeness thresholds.

The two easternmost Labrador Ridge earthquakes are located on either side of the ridge west and close to the Leif fracture zone, but likely not close enough to be associated with that fracture zone.

The rest of the earthquakes in the southern Labrador Ridge lie near the ridge axis and just to the south of it. No earthquake seems particularly associated with the next fracture zone along the ridge, the Minna, and only one with the Snorri. However, to the southwest of the ridge is the Cartwright Fracture Zone, a structure formed during the first phase of sea floor spreading, and three of the southernmost Labrador Shelf earthquakes lie along its extension to the continental margin.

At approximately 61° N and 59° W, where the Hudson Fracture Zone intersects with the ridge, there is a large concentration of earthquakes, including six of magnitude $M_L \geq 5$. Here, the mapped ridge ends (Fig. 15), approximately at the 2000 metre isobath, but the trend of earthquakes continues to the northwest for approximately 200 km until it reaches the continental margin, near the 500 metre isobath and where the crustal thickness changes rapidly from oceanic ($< 10$ km) to continental (30 km), as shown on Figure 16 (Keen and Haworth, 1984; Shih et al., 1988). This seismicity trend is strong evidence that the extinct ridge extends further to the northwest than mapped by Srivistava and Tapscott (1986), and is consistant with the crustal thickness map of Shih et al. (1988).

To the northwest of the point where the ridge meets the continent, the Southeast Baffin Shelf earthquakes also follow the continental margin, and like the Labrador Shelf earthquakes, are probably associated with faults believed to exist beneath the margin. However, given the orientation of the ridge axis, and the fact that the margin trends parallel to the Hudson Fracture Zone, it seems likely that the Southeast Baffin continental margin was a transform margin rather than a rifted margin and so the earthquakes may be occurring on faults of rather different origin.

The Labrador Shelf earthquakes are divided into two groups according to their position on the continental margin. The two northernmost and the northeastern half of the horseshoe-shaped figure, are on the oceanic side of the ocean-continental transition zone, occurring in crust of about 10 km thickness (Fig. 16). The southwest part of the horseshoe, and the southernmost earthquake are on the continental side, occurring in crust from 15 to 30 km thick. The rapid thinning of the crust, over about 50 km, occurred by listric normal faulting during the opening of the Labrador Sea. These old faults are now being reactivated in the contemporary stress field, perhaps because the crustal stresses are concentrated at the ocean-continent transition where there is a dramatic change in crustal thickness. Just why the faults are active under the central Labrador Shelf, and not also to the north and south, is not yet known. There is, however, an enigmatic relationship between the older, east-northeast–trending fracture zones like the Cartwright (which marks a major change in basin sedimentation) and the margin seismicity that may be better understood over the next decade.

Earthquakes in southern Labrador and eastern Quebec may be connected with reactivation of a late Precambrian-early Cambrian transcurrent fault system and associated pull-apart basins that extends south-south-west from Lake Melville and Sandwich Bay (Gower et al., 1986) to join the Iapetus rift faults under the St. Lawrence river (Fig. 17). The region between Lake Melville and Sept-Iles has been poorly mapped and additional faults may exist, as indicated by the presence of a major northeast-trending magnetic anomaly east of Sept-Iles (Gower et al., 1986). These faults were considered to be seismically active by Adams and Basham (1989), being a continuation of the seismically-active St. Lawrence rift system along the ancient margin of Iapetus. From Sept Iles east, the ancient margin trends eastwards, close to Newfoundland and through the strait of Belle Isle and has a low level of seismicity (Fig. 17 shows two magnitude 3 earthquakes). Adams and Basham (1989) suggested, based on the higher level of activity across southern Labrador northeast of Sept Iles, the presence the faults mappped by Gower et al. (1986), and the activity associated with the Cartwright fracture zone, that the crustal weakness might lie inland of the ancient continental margin. We suppose that the crustal weakness across southern Labrador might be reactivated in preference to the faults of the ancient continental margin because the former is along the trend of the St. Lawrence line of weakness and the latter is not.

# CONCLUSIONS

Ninety-eight earthquakes, from 1934 to December 1987, have been systematically relocated in the Labrador area. As expected, the epicentres of some of the older earthquakes have been substantially revised.

The relocations caused the pattern of seismicity to become more apparent, though it is evident that the overall picture given by the unrevised epicentres was fairly good. A long northwest to southeast trend of earthquakes became more tightly clustered about an extinct spreading ridge beneath the Labrador Sea, and a heavy concentration was found at the intersection of this ridge and the Hudson Fracture Zone. Other earthquakes concentrated at four places along the continental margin, where the earth's crust thins from 30 km thick to 10 km over a short distance, perhaps because crustal stresses are concentrated here.

It is intriguing that the Southern Labrador - eastern Quebec earthquakes together with the four southernmost Labrador Shelf earthquakes are associated with the Cartwright Fracture Zone and the ancient transcurrent fault system across Labrador. Perhaps the initiation of the fracture zone was controlled by the same ancient transcurrent fault and both are being reactivated. In any event, with the current alignment of epicentres, the major change in basin sedimentation across the Cartwright Arch, and the offset of magnetic anomaly 33 (marking the initiation of the transform fault), the origin of the Cartwright Fault Zone and its history deserve closer study.

# ACKNOWLEDGEMENTS

This open file is based on an April, 1988 student work report by Simmons with the same title. Mr. Frank Anglin, in 1984, performed a joint epicentre determination of a selected set of Labrador Ridge earthquakes and demonstrated some of the same epicentral patterns we show. He has also provided the map package we used for showing displacement vectors. Mr. Steve Halchuk revised many of the computer-generated figures in the Fall of 1990, and so prevented this open file from sitting on the shelf for another two years. We thank F. M. Anglin, J. Drysdale, and R. J. Wetmiller for their comments on the manuscript.

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# FIGURE CAPTIONS

Figure 1 - The area of onshore Labrador and the Labrador Sea showing (within the polygon) the revised earthquake epicentres obtained in this study. The four subgroups individually studied have been outlined and labeled. A1, A2: Labrador Ridge , B: southeast Baffin Shelf, C: Labrador Shelf , D: southern Labrador - eastern Quebec.

Figure 2 - Graph comparing the magnitude of detected earthquakes vs. time in the Labrador Sea, showing the increase in detection capability since the early 1960's.

Figure 3 - Completeness thresholds from 1963 to 1977, showing the limits to which earthquakes of certain magnitudes could be detected and located in the Labrador Sea.

Figure 4 - Completeness thresholds from 1977 to the present, showing the limits to which earthquakes of certain magnitudes could be detected and located in the Labrador Sea.

Figure 5 - Original locations of the studied earthquakes from the Canadian Earthquake Epicentre File (CEEF). Only those earthquakes that are inside the polygon were studied.

Figure 6 - Displacement vectors showing the difference in location between the original and revised epicentres of the relocated earthquakes. The arrowheads point toward the revised location.

Figure 7 - Revised epicentres of the relocated earthquakes. Note the representation of the earthquakes by open circles which are proportional to their magnitudes. The trend of Labrador Ridge earthquakes running northwest to southeast has narrowed, and the cluster of Labrador Shelf Earthquakes has assumed a horseshoe-shaped pattern. In this and subsequent figures the earthquakes can be identified by comparison to Tables 1 – 4.

Figure 8 - The original and revised epicentres of earthquakes on the southern Labrador Ridge, connected by displacement vectors pointing toward the new locations. In the upper left hand corner the displacement vector for event 620803 passes through the area.

Figure 9 - The original and revised epicentres of earthquakes on the northern Labrador Ridge, connected by displacement vectors pointing toward the new locations. The displacement vector for event 620803 comes in off the bottom of the map as the original location is over 1000 km away.

Figure 10 - The original and revised epicentres of earthquakes on the Southeast Baffin Shelf, connected by displacement vectors pointing toward the new locations.

Figure 11 - The original and revised epicentres of earthquakes on the Labrador Shelf, connected by displacement vectors pointing toward the new locations.

Figure 12 - The revised epicentres (open circles) of earthquakes on the Labrador Shelf together with their relocation vectors. The diamond-shaped boxes surrounding the epicentres indicate the errors in latitude and longitude.

Figure 13 - The original and revised epicentres of earthquakes in southern Labrador and eastern Quebec, connected by displacement vectors pointing toward the new locations.

Figure 14 - Graph comparing the $M_L$ magnitudes to the $m_b$ magnitudes for nine Labrador Sea earthquakes. The solid line represents a linear relationship between the two scales with a slope of 1.0 and no bias. The dashed line is the chosen relationship with the same slope, but a bias of 0.38.

Figure 15 - Seismicity of the Labrador Sea showing the relationship between the relocated epicentres and the extinct ridge and fracture zones. (Base figure from Srivastava and Tapscott, 1986)

Figure 16 - Crustal thickness under the Labrador Sea, showing the rapid transition from the thin sea floor (> 10 km) to the thick continental crust (30 km) in approximately 50 km. (Crustal thickness data after Shih et al., 1988)

Figure 17 - Revised seismicity of southern Labrador and eastern Quebec showing the relationships of the relocated epicentres to faults (short dashed lines) and the aeromagnetic anomaly (long dashed line) sketched from Gower et al (1986).

# TABLE 1

**Relocation of Labrador Ridge Earthquakes**

Note: The first line of each set contains the original data from CEEF files.
The second line contains the revisions obtained in this study.

| DATE YY/MM/DD | | | TIME HH:MM:SS | | | LAT. (N) | LONG. (W) | MAGNITUDE $m_b$ | $m_N$ | $M_L$ | $M_S$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1934 | 06 | 15 | 06 | 34 | 25 | 61.5 | 59.0 | | | | 5.6 | $M_S$ |
| | | | | | 282 | 60.764 | 58.749 | | | | | |
| 1958 | 02 | 04 | 08 | 06 | 43 | 57.9 | 53.5 | | | 5.1 | | $M_L$ |
| | | | | | 361 | 57.898 | 52.151 | | | 5.3 | | $M_L$ |
| 1962 | 08 | 03 | 01 | 31 | 02 | 52.0 | 54.2 | | | 4.8 | | $M_L$ |
| | | | | | 042 | 61.027 | 58.225 | | | 4.8 | | $M_L$ |
| 1962 | 10 | 26 | 10 | 29 | 20 | 60.8 | 57.5 | | | 5.0 | | $M_L$ |
| | | | | | 229 | 61.018 | 58.857 | | | 5.1 | | $M_L$ |
| 1962 | 11 | 30 | 02 | 12 | 00 | 58.8 | 54.8 | | | 4.5 | | $M_L$ |
| | | | | | 024 | 58.748 | 55.454 | | | 4.4 | | $M_L$ |
| 1962 | 12 | 02 | 14 | 00 | 57 | 60.9 | 58.3 | | | 4.5 | | $M_L$ |
| | | | | | 58.0 | 61.014 | 59.530 | | | 5.0 | | $M_L$ |
| 1964 | 02 | 22 | 15 | 53 | 08 | 60.83 | 61.17 | | | 3.5 | | $M_L$ |
| | | | | | 037 | 60.848 | 60.072 | | | 3.6 | | $M_L$ |
| 1965 | 02 | 22 | 15 | 57 | 43 | 61.50 | 60.67 | | | 3.7 | | $M_L$ |
| | | | | | 395 | 61.537 | 59.247 | | | 3.8 | | $M_L$ |
| 1965 | 08 | 10 | 08 | 21 | 16 | 61.75 | 61.50 | 4.2 | | | | $m_b$ |
| | | | | | 023 | 61.542 | 59.747 | | | 4.8 | | $m_b$ |
| 1965 | 12 | 30 | 21 | 12 | 14 | 60.92 | 60.67 | | | 4.2 | | $M_L$ |
| | | | | | 075 | 61.174 | 60.462 | | | 4.3 | | $M_L$ |
| 1965 | 12 | 31 | 21 | 31 | 25 | 59.66 | 56.83 | | | 4.5 | | $M_L$ |
| | | | | | 179 | 59.612 | 55.918 | | | 4.6 | | $M_L$ |
| 1966 | 01 | 11 | 02 | 56 | 29 | 60.78 | 58.00 | | | 4.3 | | $M_L$ |
| | | | | | 317 | 60.665 | 59.018 | | | 4.2 | | $M_L$ |
| 1966 | 04 | 28 | 23 | 28 | 59 | 60.67 | 57.83 | | | 4.8 | | $M_L$ |
| | | | | | 049 | 60.334 | 58.160 | | | 4.8 | | $M_L$ |
| 1966 | 11 | 30 | 00 | 58 | 01 | 60.17 | 56.17 | | | 4.0 | | $M_L$ |
| | | | | | 047 | 60.101 | 56.397 | | | 4.0 | | $M_L$ |
| 1966 | 11 | 30 | 11 | 45 | 13 | 60.20 | 55.93 | | | 4.1 | | $M_L$ |
| | | | | | 167 | 60.176 | 56.495 | | | 4.1 | | $M_L$ |
| 1967 | 08 | 27 | 18 | 45 | 15 | 62.17 | 60.33 | | | 4.5 | | $M_L$ |
| | | | | | 140 | 61.803 | 60.864 | | | 4.5 | | $M_L$ |
| 1967 | 11 | 15 | 03 | 14 | 15 | 61.10 | 58.00 | | | 4.3 | | $M_L$ |
| | | | | | 170 | 60.821 | 59.232 | | | 4.3 | | $M_L$ |

# TABLE 1 – continued

**Relocation of Labrador Ridge Earthquakes**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1968 | 03 | 17 | 17 | 01 | 33 | 59.88 | 56.40 | | | 3.5 | $M_L$ |
| | | | | | 294 | 59.892 | 55.832 | | | 3.6 | $M_L$ |
| 1968 | 04 | 16 | 00 | 03 | 23 | 61.82 | 61.40 | | 3.3 | | $m_N$ |
| | | | | | 486 | 60.951 | 58.851 | | 3.4 | | $m_N$ |
| 1969 | 07 | 23 | 08 | 34 | 35 | 56.51 | 46.49 | 4.1 | | | $m_b$ |
| | | | | | 372 | 56.406 | 46.669 | | | 4.6 | $m_b$ |
| 1969 | 11 | 24 | 21 | 14 | 12 | 60.54 | 59.13 | 4.9 | | | $m_b$ |
| | | | | | 122 | 60.653 | 58.907 | | | 5.4 | $m_b$ |
| 1969 | 11 | 30 | 14 | 38 | 06 | 60.55 | 59.22 | | | 4.2 | $M_L$ |
| | | | | | 068 | 60.501 | 59.429 | | | 4.1 | $M_L$ |
| 1970 | 07 | 03 | 00 | 32 | 36 | 60.89 | 60.47 | | | 4.2 | $M_L$ |
| | | | | | 345 | 60.913 | 60.017 | | | 4.2 | $M_L$ |
| 1971 | 01 | 12 | 17 | 36 | 04 | 62.31 | 62.33 | | 3.9 | | $m_N$ |
| | | | | | 038 | 62.160 | 62.175 | | | 5.1 | $M_N$ |
| 1971 | 02 | 22 | 11 | 45 | 04 | 60.63 | 59.46 | | | 3.3 | $M_L$ |
| | | | | | 032 | 60.636 | 59.315 | | | 3.3 | $M_L$ |
| 1971 | 04 | 16 | 01 | 31 | 45 | 61.75 | 60.68 | | | 4.3 | $M_L$ |
| | | | | | 479 | 61.764 | 60.960 | | | 4.6 | $M_L$ |
| 1971 | 07 | 13 | 01 | 32 | 12 | 60.63 | 57.45 | | | 3.8 | $M_L$ |
| | | | | | 098 | 60.635 | 57.197 | | | 3.8 | $M_L$ |
| 1972 | 06 | 25 | 14 | 34 | 07 | 62.14 | 61.06 | | 3.3 | | $m_N$ |
| | | | | | 057 | 62.121 | 60.870 | | 3.3 | | $m_N$ |
| 1972 | 08 | 13 | 23 | 38 | 18 | 61.68 | 62.20 | | 3.2 | | $m_N$ |
| | | | | | 132 | 61.715 | 61.256 | | 3.2 | | $m_N$ |
| 1973 | 08 | 27 | 01 | 49 | 36 | 60.07 | 57.91 | | | 4.4 | $M_L$ |
| | | | | | 351 | 60.072 | 57.779 | | | 4.3 | $M_L$ |
| 1973 | 10 | 12 | 03 | 54 | 28 | 61.34 | 59.99 | 4.2 | | 4.4 | $M_L$ |
| | | | | | 284 | 61.361 | 59.673 | | | 4.9 | $m_b$ |
| 1975 | 12 | 13 | 09 | 24 | 27 | 57.94 | 52.25 | | | 4.5 | $M_L$ |
| | | | | | 278 | 58.001 | 52.388 | 4.4 | | | $m_b$ |
| 1977 | 09 | 24 | 17 | 19 | 44 | 58.25 | 54.24 | | | 4.8 | $M_L$ |
| | | | | | 440 | 58.275 | 54.166 | | | 4.8 | $M_L$ |
| 1978 | 08 | 20 | 20 | 34 | 07 | 60.70 | 59.02 | | | 4.1 | $M_L$ |
| | | | | | 067 | 60.741 | 58.735 | | | 4.2 | $M_L$ |
| 1978 | 09 | 06 | 10 | 21 | 31 | 60.07 | 56.29 | | | 4.2 | $M_L$ |
| | | | | | 314 | 60.089 | 56.173 | | | 4.2 | $M_L$ |
| 1978 | 09 | 14 | 07 | 54 | 43 | 60.13 | 56.45 | | | 4.2 | $M_L$ |
| | | | | | 413 | 60.137 | 56.086 | | | 4.2 | $M_L$ |

# TABLE 1 – continued

**Relocation of Labrador Ridge Earthquakes**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 12 | 09 | 00 | 13 | 53 | 60.87 | 59.21 | | | 4.2 | | $M_L$ |
| | | | | | 543 | 60.850 | 59.189 | | | 4.2 | | $M_L$ |
| New event | | | | | | | | | | | | |
| 1979 | 10 | 23 | 11 | 01 | 014 | 57.022 | 45.711 | 4.6 | | | | $m_b$ |
| 1980 | 03 | 11 | 22 | 09 | 59 | 62.28 | 61.82 | | 3.6 | | | $m_N$ |
| | | | | | 554 | 62.334 | 61.240 | | | 4.4 | | $M_L$ |
| 1980 | 05 | 23 | 04 | 14 | 49 | 60.92 | 58.90 | | | 3.7 | | $M_L$ |
| | | | | | 472 | 60.931 | 58.697 | | | 3.3 | | $M_L$ |
| 1981 | 04 | 06 | 20 | 29 | 57 | 61.94 | 61.34 | 4.9 | 4.8 | | | $m_N$ |
| | | | | | 586 | 61.841 | 61.577 | | 5.0 | | 3.6 | $m_b$ |
| 1981 | 08 | 24 | 11 | 20 | 34 | 61.33 | 59.39 | 4.8 | | | 4.6 | $m_b$ |
| | | | | | 336 | 61.300 | 59.014 | | | 5.2 | | $m_b$ |
| 1981 | 09 | 01 | 07 | 46 | 05 | 61.29 | 59.79 | | | 3.8 | | $M_L$ |
| | | | | | 036 | 61.347 | 59.451 | | | 3.8 | | $M_L$ |
| 1982 | 06 | 27 | 13 | 28 | 54 | 62.00 | 61.89 | | | 3.7 | | $M_L$ |
| | | | | | 517 | 62.027 | 61.598 | | | 3.7 | | $M_L$ |
| 1983 | 02 | 12 | 18 | 19 | 09 | 60.91 | 59.58 | 4.4 | | | | $m_b$ |
| | | | | | 093 | 60.901 | 59.523 | | | 5.0 | | $m_b$ |
| 1983 | 04 | 05 | 07 | 20 | 27 | 60.91 | 58.88 | | | 3.6 | | $M_L$ |
| | | | | | 309 | 60.834 | 59.096 | | | 3.6 | | $M_L$ |
| 1983 | 05 | 26 | 22 | 29 | 31 | 59.15 | 54.41 | | | 4.5 | | $M_L$ |
| | | | | | 315 | 59.139 | 54.381 | | | 4.6 | | $M_L$ |
| 1984 | 02 | 02 | 07 | 32 | 05 | 59.93 | 55.93 | | | 4.3 | | $M_L$ |
| | | | | | 041 | 59.883 | 55.673 | | | 4.3 | | $M_L$ |
| New event | | | | | | | | | | | | |
| 1984 | 04 | 06 | 06 | 45 | 351 | 60.130 | 57.560 | | | 3.1 | | $M_L$ |
| 1984 | 12 | 03 | 22 | 27 | 33 | 61.54 | 60.39 | | | 4.2 | | $M_L$ |
| | | | | | 358 | 61.564 | 60.625 | | | 4.0 | | $M_L$ |
| 1985 | 12 | 05 | 01 | 27 | 050 | 60.660 | 60.140 | | | 4.2 | | $M_L$ |
| | | | | | 045 | 60.702 | 59.970 | | | 4.2 | | $M_L$ |
| 1986 | 04 | 12 | 19 | 36 | 292 | 57.702 | 53.519 | | | 4.4 | | $M_L$ |
| | | | | | 280 | 57.676 | 53.252 | | | 4.4 | | $M_L$ |
| 1986 | 09 | 12 | 17 | 41 | 074 | 60.784 | 57.237 | | | 4.2 | | $M_L$ |
| | | | | | 095 | 60.798 | 57.402 | | | 4.2 | | $M_L$ |
| 1987 | 03 | 07 | 22 | 29 | 002 | 61.146 | 58.942 | | | 4.5 | | $M_L$ |
| | | | | | 588 | 61.157 | 58.695 | | | 4.5 | | $M_L$ |
| 1987 | 05 | 15 | 18 | 41 | 257 | 62.111 | 61.378 | | | 4.7 | | $M_L$ |
| | | | | | 221 | 62.160 | 60.488 | | | 4.7 | | $M_L$ |

# TABLE 2

**Relocation of Southeast Baffin Shelf Earthquakes**

| DATE YY/MM/DD | TIME HH:MM:SS | LAT. (N) | LONG. (W) | MAGNITUDE $m_b$ | $m_N$ | $M_L$ | $M_S$ | |
|---|---|---|---|---|---|---|---|---|
| 1966 05 01 | 13 15 06 | 63.33 | 60.83 | | | 4.8 | | $M_L$ |
| | 060 | 63.694 | 61.175 | | 3.9 | | | $m_N$ |
| 1971 08 14 | 02 00 57 | 65.38 | 62.64 | | 3.3 | | | $m_N$ |
| | 565 | 65.410 | 62.694 | | 3.1 | | | $m_N$ |
| 1971 08 14 | 02 02 48 | 65.39 | 62.72 | | 3.5 | | | $m_N$ |
| | 481 | 65.417 | 62.833 | | 3.3 | | | $m_N$ |
| 1971 08 14 | 02 04 06 | 65.38 | 62.64 | | 3.2 | | | $m_N$ |
| | 055 | 65.410 | 62.694 | | 3.0 | | | $m_N$ |
| 1972 03 25 | 14 08 18 | 64.57 | 60.95 | | | 3.6 | | $M_L$ |
| | 138 | 64.586 | 60.187 | | | 4.3 | | $M_L$ |
| 1980 07 06 | 01 06 23 | 63.94 | 61.08 | | | 3.0 | | $M_L$ |
| | 369 | 64.397 | 62.284 | | | 3.2 | | $M_L$ |
| 1982 05 06 | 22 21 04 | 63.36 | 60.62 | | | 4.2 | | $M_L$ |
| | 038 | 63.644 | 60.549 | | | 4.2 | | $M_L$ |
| 1986 03 09 | 02 58 320 | 62.840 | 60.990 | | 3.5 | | | $m_N$ |
| | 333 | 62.850 | 60.822 | | 3.5 | | | $m_N$ |
| 1987 08 20 | 01 14 338 | 64.287 | 61.811 | | | 2.7 | | $M_L$ |
| | 355 | 64.172 | 61.983 | | | 2.7 | | $M_L$ |

# TABLE 3

**Relocation of Labrador Shelf Earthquakes**

| DATE YY/MM/DD | TIME HH:MM:SS | LAT. (N) | LONG. (W) | MAGNITUDE $m_b$ | $m_N$ | $M_L$ | $M_S$ | |
|---|---|---|---|---|---|---|---|---|
| 1952 10 20 | 01 04 35 | 57.0 | 57.0 | | | 5.0 | | $M_L$ |
| | 390 | 57.010 | 57.730 | | | 5.0 | | $M_L$ |
| 1956 06 05 | 07 45 16 | 56.8 | 58.9 | | | 5.1 | | $M_L$ |
| | 173 | 57.103 | 59.079 | | 4.3 | | | $M_N$ |
| 1963 03 12 | 07 06 08 | 57.0 | 60.03 | | | 3.8 | | $M_L$ |
| | 097 | 56.691 | 59.797 | | 3.4 | | | $m_N$ |
| 1967 12 27 | 03 16 43 | 58.75 | 59.25 | | | 3.8 | | $M_L$ |
| | 461 | 59.039 | 59.866 | | | 3.8 | | $M_L$ |
| 1968 01 13 | 03 10 26 | 57.16 | 58.50 | | 2.6 | | | $m_N$ |
| | 336 | 57.402 | 59.170 | | 2.6 | | | $m_N$ |
| 1969 09 27 | 22 53 58 | 56.52 | 57.49 | | 4.1 | | | $m_N$ |
| | 568 | 56.797 | 57.511 | | | 4.5 | | $M_L$ |
| 1971 12 07 | 12 04 18 | 55.09 | 54.51 | 5.4 | | 5.3 | | $M_L$ |
| | 195 | 54.965 | 54.669 | | 5.3 | | | $m_b$ |
| 1972 01 25 | 02 40 01 | 55.14 | 54.42 | | | 4.5 | | $M_L$ |
| | 012 | 55.141 | 54.394 | | | 4.7 | | $M_L$ |
| 1976 05 26 | 18 26 33 | 55.47 | 52.74 | | | 4.4 | | $M_L$ |
| | 309 | 55.480 | 52.453 | | | 4.2 | | $M_L$ |
| 1977 11 05 | 08 49 31 | 59.05 | 60.61 | | | 4.2 | | $M_L$ |
| | 281 | 59.255 | 60.242 | | | 4.2 | | $M_L$ |
| 1979 03 31 | 07 54 42 | 56.71 | 59.95 | | 2.7 | | | $m_N$ |
| | 355 | 56.916 | 59.375 | | 2.7 | | | $m_N$ |
| 1979 04 04 | 17 32 53 | 56.14 | 58.92 | | 3.2 | | | $m_N$ |
| | 510 | 55.939 | 58.436 | | 3.2 | | | $m_N$ |
| 1979 09 04 | 09 10 16 | 57.58 | 58.96 | | | 4.2 | | $M_L$ |
| | 147 | 57.598 | 58.772 | | | 4.2 | | $M_L$ |
| 1982 07 02 | 23 52 39 | 56.18 | 59.11 | | | 3.6 | | $M_L$ |
| | 383 | 56.150 | 58.877 | | | 3.6 | | $M_L$ |
| 1983 08 20 | 15 30 29 | 56.39 | 59.21 | | 3.3 | | | $m_N$ |
| | 270 | 56.531 | 59.073 | | 3.4 | | | $m_N$ |
| 1986 01 08 | 02 00 150 | 57.290 | 58.160 | | | 4.3 | | $M_L$ |
| | 169 | 57.287 | 58.167 | | | 4.3 | | $M_L$ |
| 1986 01 08 | 02 12 150 | 57.290 | 58.160 | | | | | |
| | 155 | 57.287 | 58.082 | | | 3.6 | | $M_L$ |

# TABLE 3 – continued

## Relocation of Labrador Shelf Earthquakes

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1986 | 04 | 20 | 09 | 59 | 542 | 57.384 | 59.509 | 4.7 | 4.8 | | $m_N$ |
| | | | | | 549 | 57.353 | 59.204 | | 4.8 | | $m_b$ |
| 1986 | 09 | 24 | 06 | 04 | 569 | 54.374 | 54.998 | 4.2 | 4.5 | | $m_N$ |
| | | | | | 574 | 54.263 | 54.739 | | 4.6 | | $m_b$ |
| 1987 | 12 | 14 | 21 | 09 | 266 | 56.854 | 56.124 | | | 4.6 | $M_L$ |
| | | | | | 309 | 56.648 | 56.261 | | | 4.6 | $M_L$ |

# TABLE 4

**Relocation of Southern Labrador - Eastern Quebec Earthquakes**

| DATE YY/MM/DD | TIME HH:MM:SS | LAT. (N) | LONG. (W) | MAGNITUDE $m_b$ | $m_N$ | $M_L$ | $M_S$ | |
|---|---|---|---|---|---|---|---|---|
| 1955 11 21 | 16 10 41 | 50.58 | 63.50 | | 4.0 | | | $m_N$ |
| | 356 | 50.972 | 63.136 | | 4.1 | | | $m_N$ |
| 1962 12 20 | 04 23 12 | 52.8 | 59.4 | | | 4.4 | | $M_L$ |
| | 121 | 52.882 | 59.223 | | 4.1 | | | $m_N$ |
| 1963 04 04 | 08 53 06 | 53.4 | 59.7 | | | 3.5 | | $M_L$ |
| | 013 | 53.105 | 59.330 | | 3.3 | | | $m_N$ |
| 1963 10 25 | 08 49 39 | 51.4 | 61.90 | | | 3.3 | | $M_L$ |
| | 473 | 51.481 | 62.733 | | 2.9 | | | $m_N$ |
| 1966 10 15 | 20 34 08 | 53.427 | 57.17 | | | 4.4 | | $M_L$ |
| | 043 | 53.461 | 57.089 | | 3.7 | | | $m_N$ |
| 1967 11 02 | 03 35 38 | 52.20 | 58.40 | | | 3.4 | | $M_L$ |
| | 385 | 51.849 | 58.846 | | 3.0 | | | $m_N$ |
| 1973 10 13 | 01 39 14 | 49.57 | 61.36 | | 3.1 | | | $m_N$ |
| | 112 | 49.597 | 60.917 | | 3.1 | | | $m_N$ |
| 1973 10 23 | 12 37 10 | 51.26 | 62.39 | | 3.2 | | | $m_N$ |
| | 136 | 51.323 | 62.540 | | 3.3 | | | $m_N$ |
| New event | | | | | | | | |
| 1979 01 05 | 05 39 268 | 51.878 | 58.033 | | | 3.0 | | $M_L$ |
| 1981 11 22 | 00 01 49 | 52.73 | 62.95 | | 2.7 | | | $m_N$ |
| | 473 | 52.634 | 62.694 | | 2.9 | | | $m_N$ |
| 1982 04 10 | 06 17 56 | 51.15 | 59.64 | | 3.2 | | | $m_N$ |
| | 560 | 51.219 | 59.608 | | 3.5 | | | $m_N$ |
| 1982 10 03 | 04 31 05 | 51.25 | 62.81 | | 3.3 | | | $m_N$ |
| | 011 | 51.197 | 62.194 | | 3.4 | | | $m_N$ |
| 1985 02 24 | 15 26 09 | 49.34 | 64.28 | | 3.0 | | | $m_N$ |
| | 094 | 49.382 | 64.246 | | 3.0 | | | $m_N$ |
| 1987 12 11 | 22 19 113 | 50.435 | 58.303 | | 3.4 | | | $m_N$ |
| | 099 | 50.551 | 58.171 | | 3.4 | | | $m_N$ |

Figure 1 - The area of onshore Labrador and the Labrador Sea showing (within the polygon) the revised earthquake epicentres obtained in this study. The four subgroups individually studied have been outlined and labeled. A1, A2: Labrador Ridge , B: southeast Baffin Shelf, C: Labrador Shelf , D: southern Labrador - eastern Quebec.

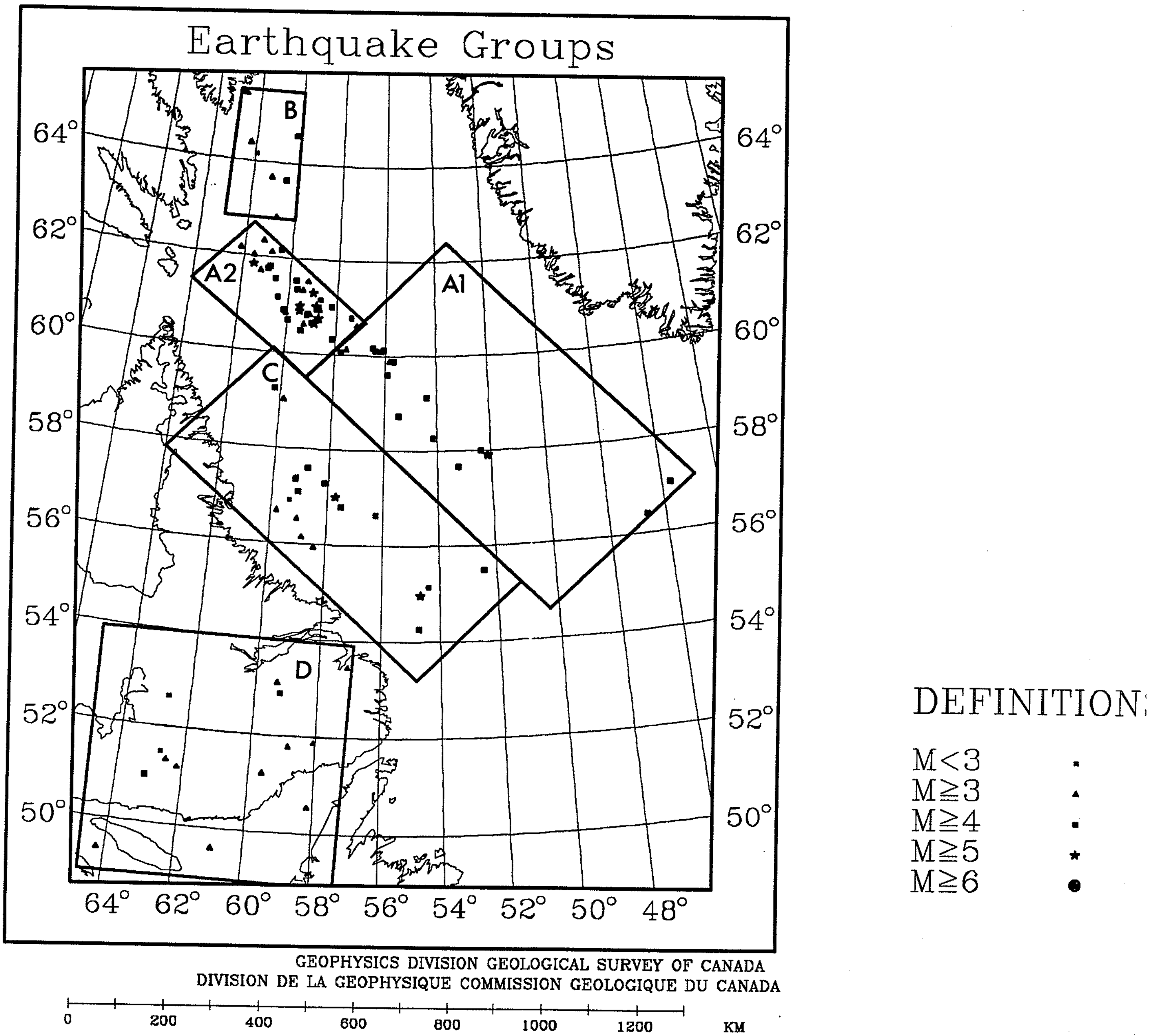


Figure 2 - Graph comparing the magnitude of detected earthquakes vs. time in the Labrador Sea, showing the increase in detection capability since the early 1960's.

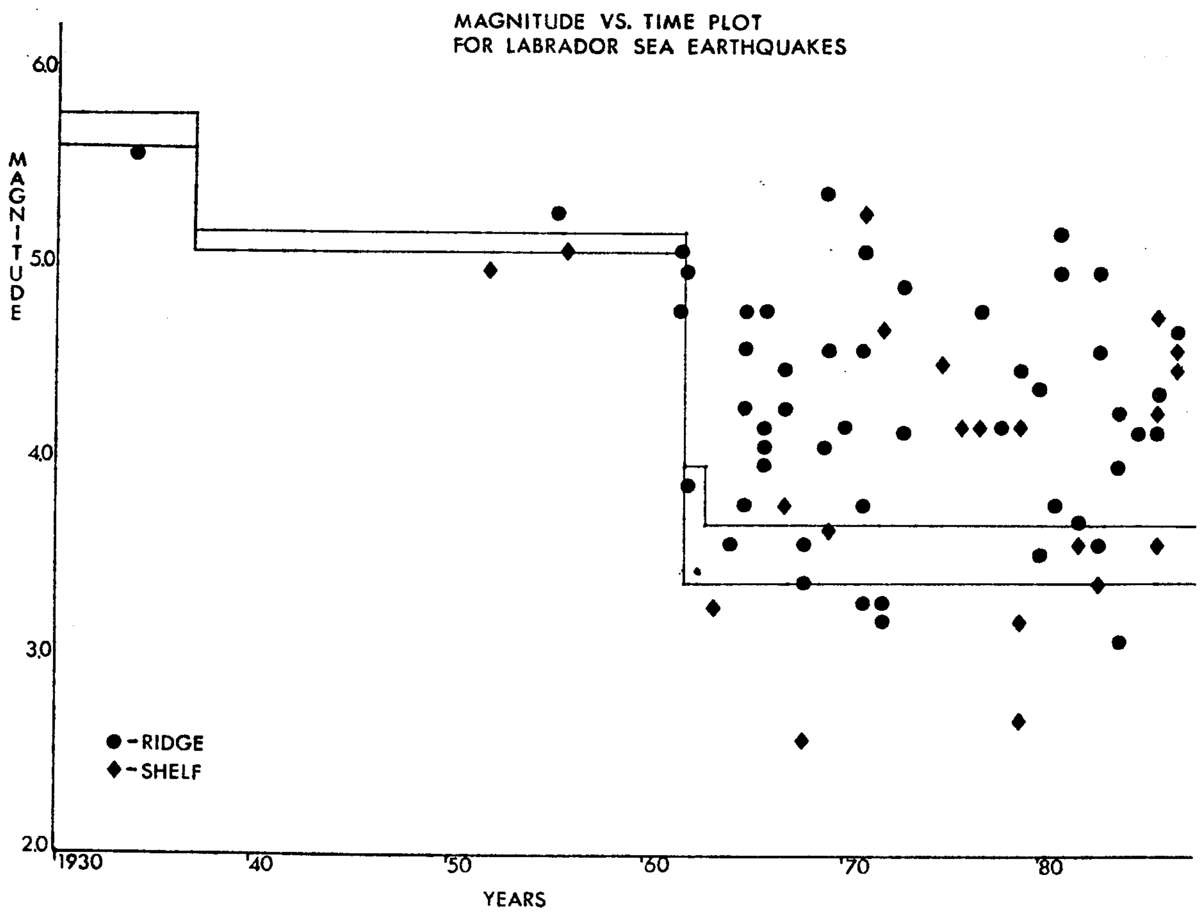


Figure 3 - Completeness thresholds from 1963 to 1977, showing the limits to which earthquakes of certain magnitudes could be detected and located in the Labrador Sea.

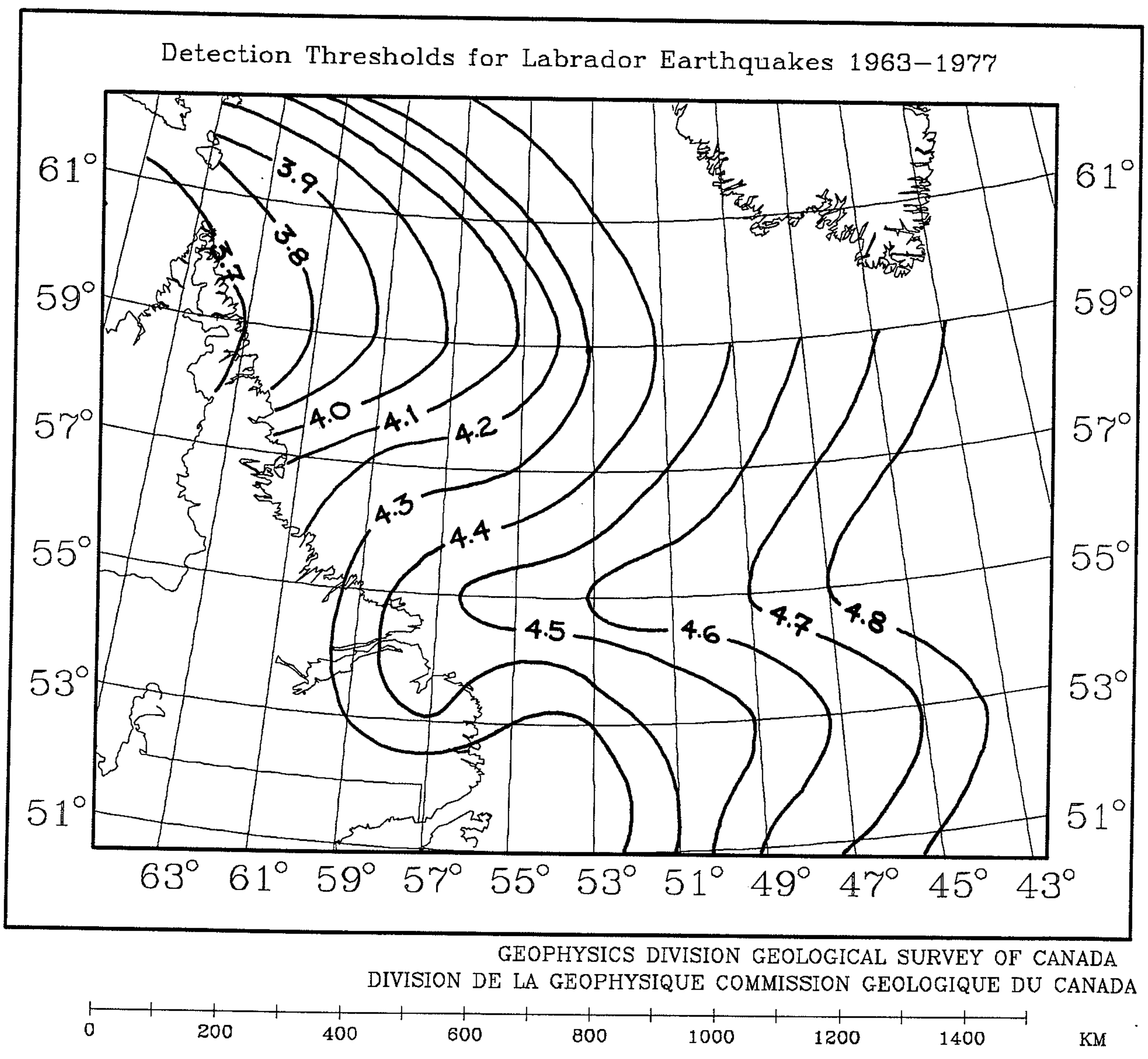


Figure 4 - Completeness thresholds from 1977 to the present, showing the limits to which earthquakes of certain magnitudes could be detected and located in the Labrador Sea.

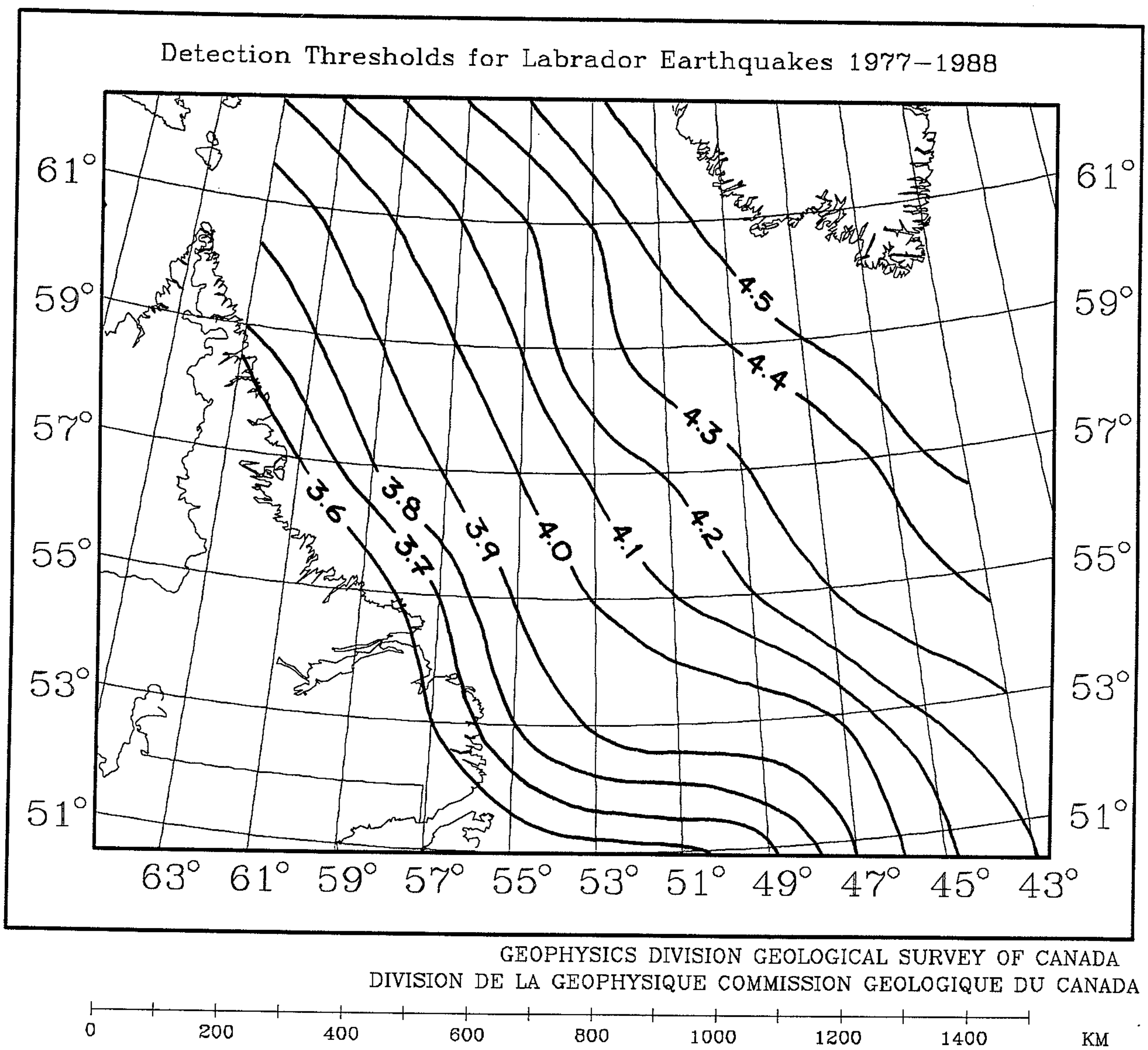


Figure 5 - Original locations of the studied earthquakes from the Canadian Earthquake Epicentre File (CEEF). Only those earthquakes that are inside the polygon were studied.

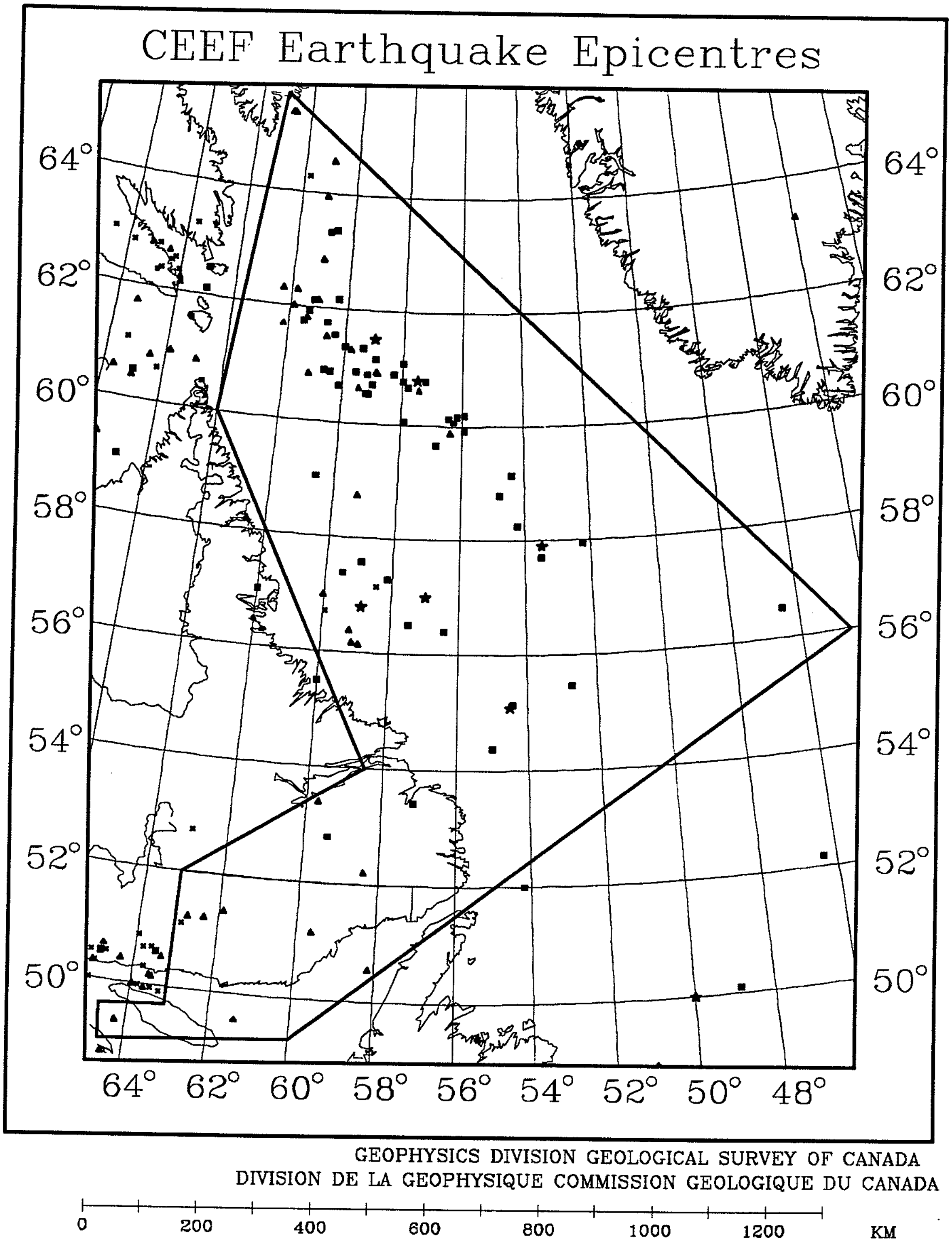


Figure 6 - Displacement vectors showing the difference in location between the original and revised epicentres of the relocated earthquakes. The arrowheads point toward the revised location.

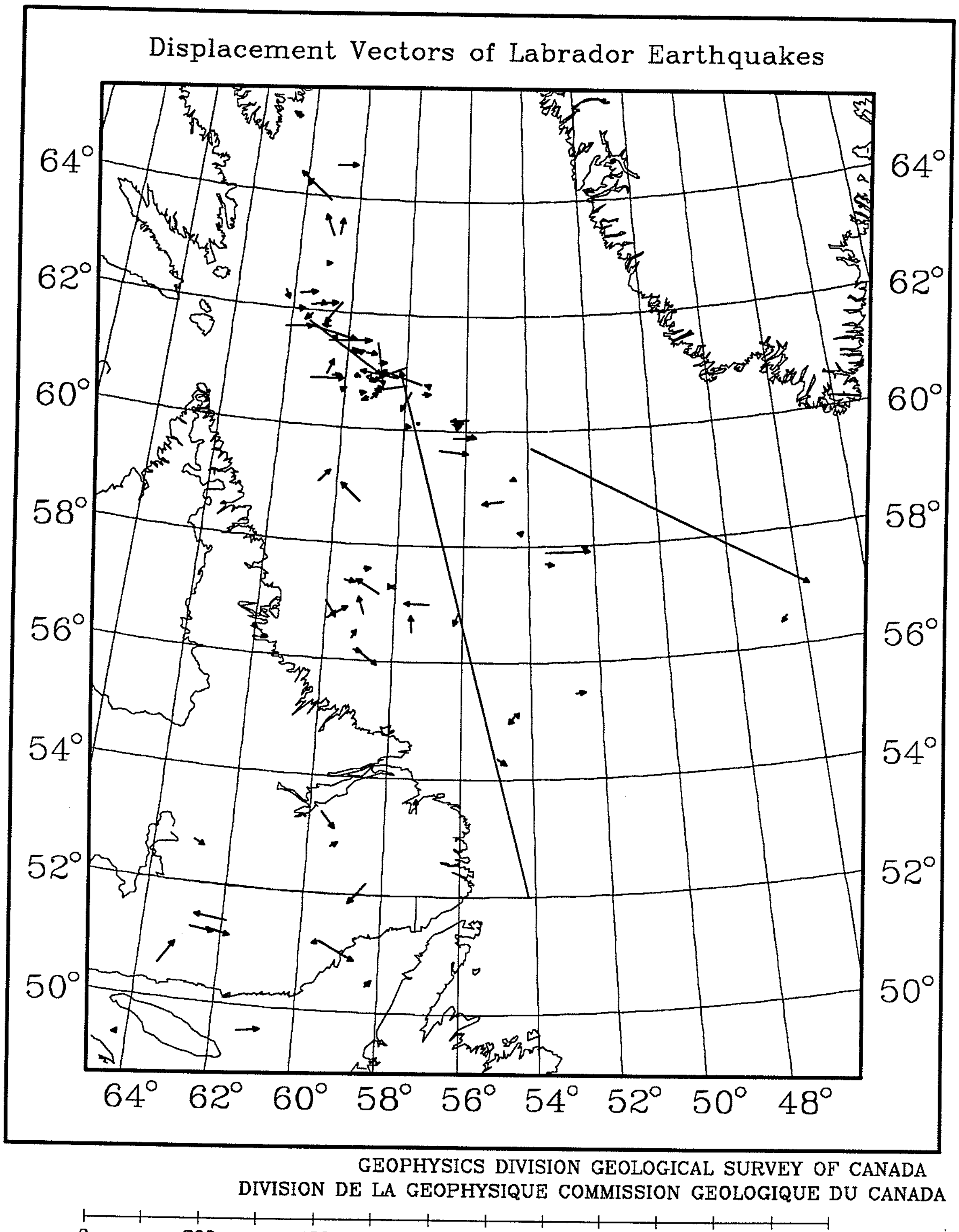


Figure 7 - Revised epicentres of the relocated earthquakes. Note the representation of the earthquakes by open circles which are proportional to their magnitudes. The trend of Labrador Ridge earthquakes running northwest to southeast has narrowed, and the cluster of Labrador Shelf Earthquakes has assumed a horseshoe-shaped pattern. In this and subsequent figures the earthquakes can be identified by comparison to Tables 1 – 4.

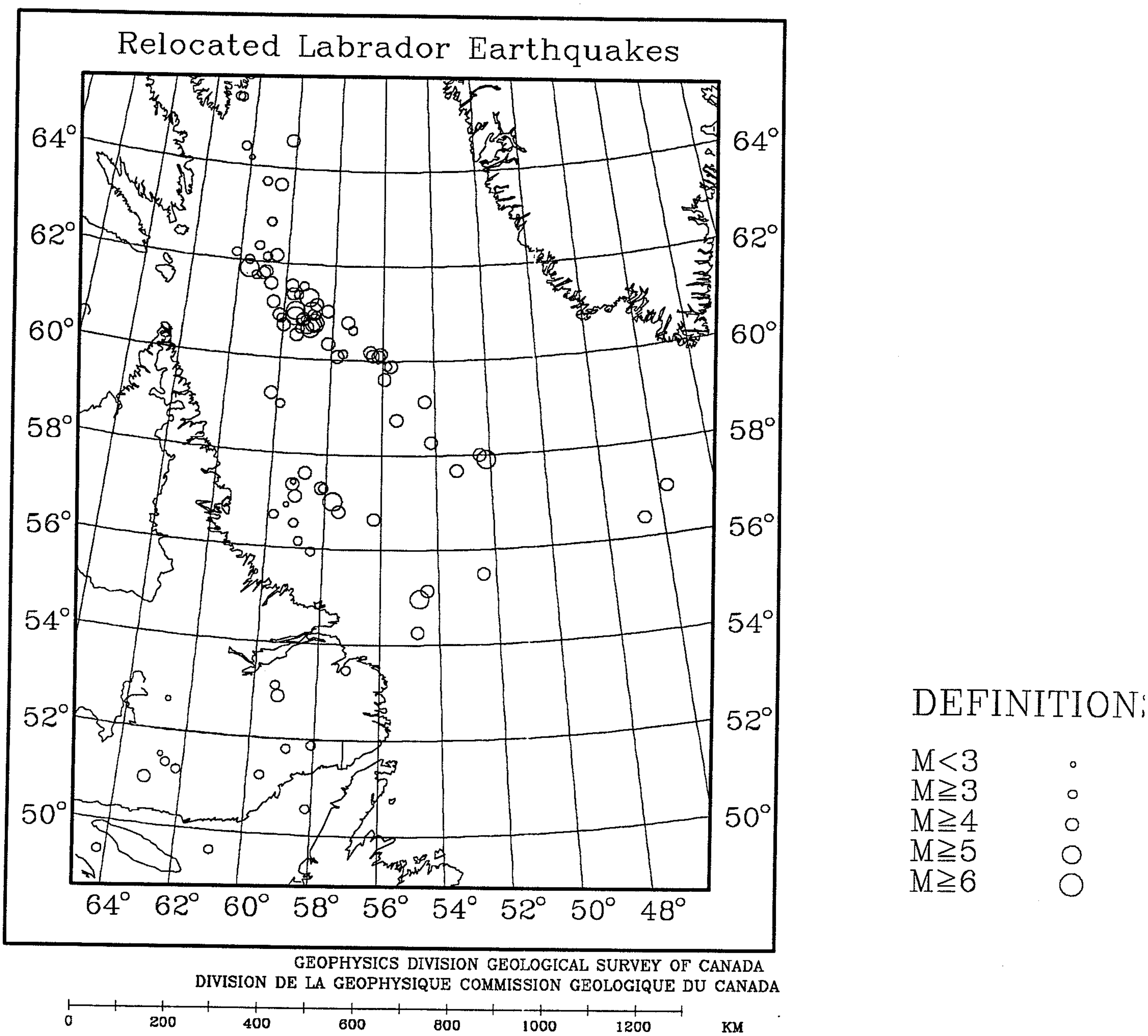
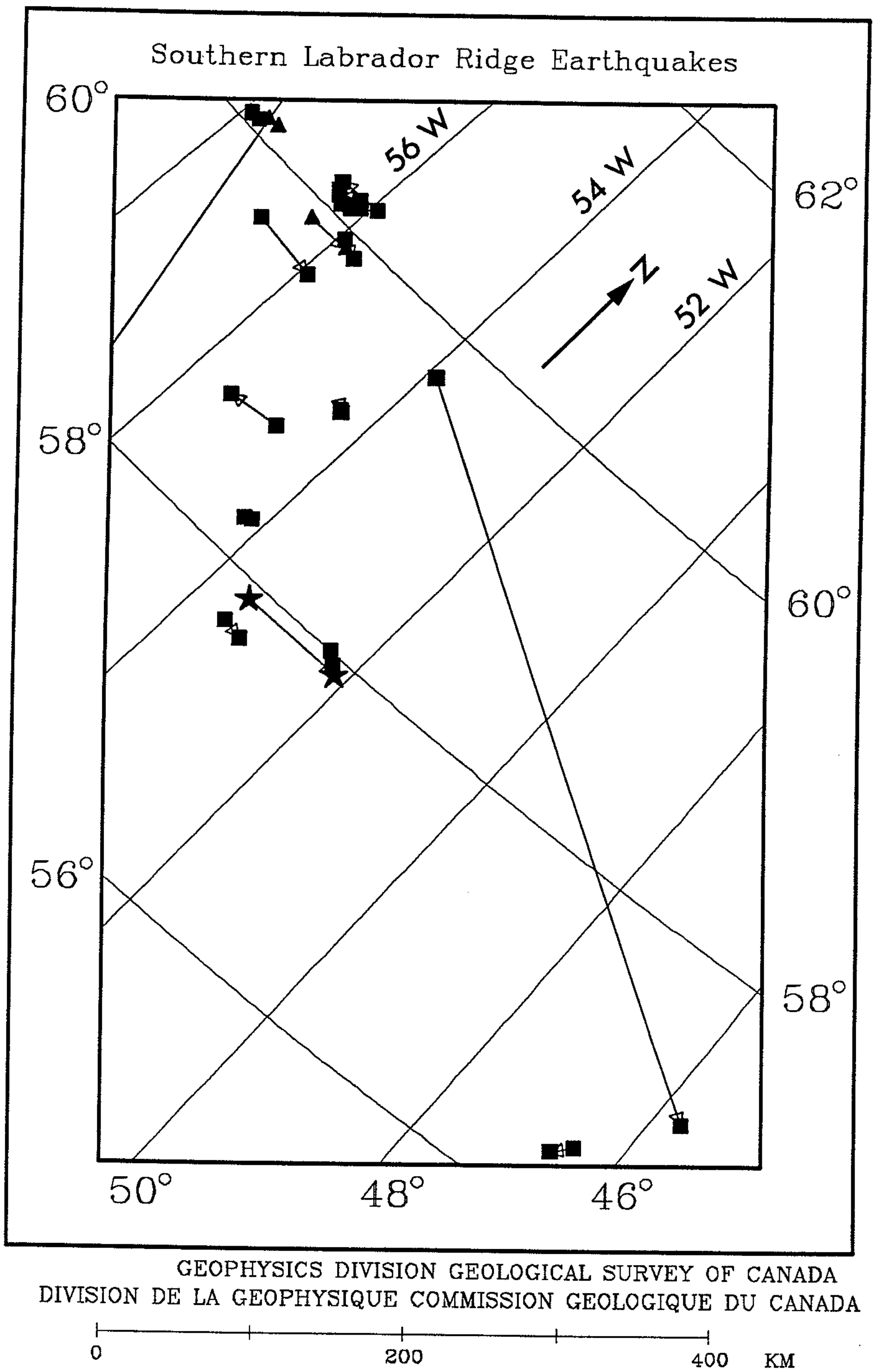


Figure 8 - The original and revised epicentres of earthquakes on the southern Labrador Ridge, connected by displacement vectors pointing toward the new locations. In the upper left hand corner the displacement vector for event 620803 passes through the area.



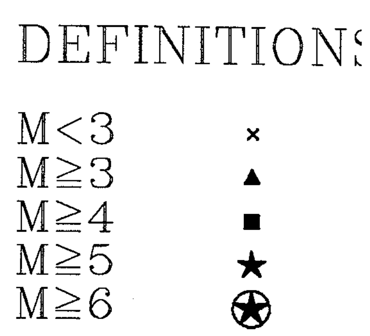



Figure 9 - The original and revised epicentres of earthquakes on the northern Labrador Ridge, connected by displacement vectors pointing toward the new locations. The displacement vector for event 620803 comes in off the bottom of the map as the original location is over 1000 km away.

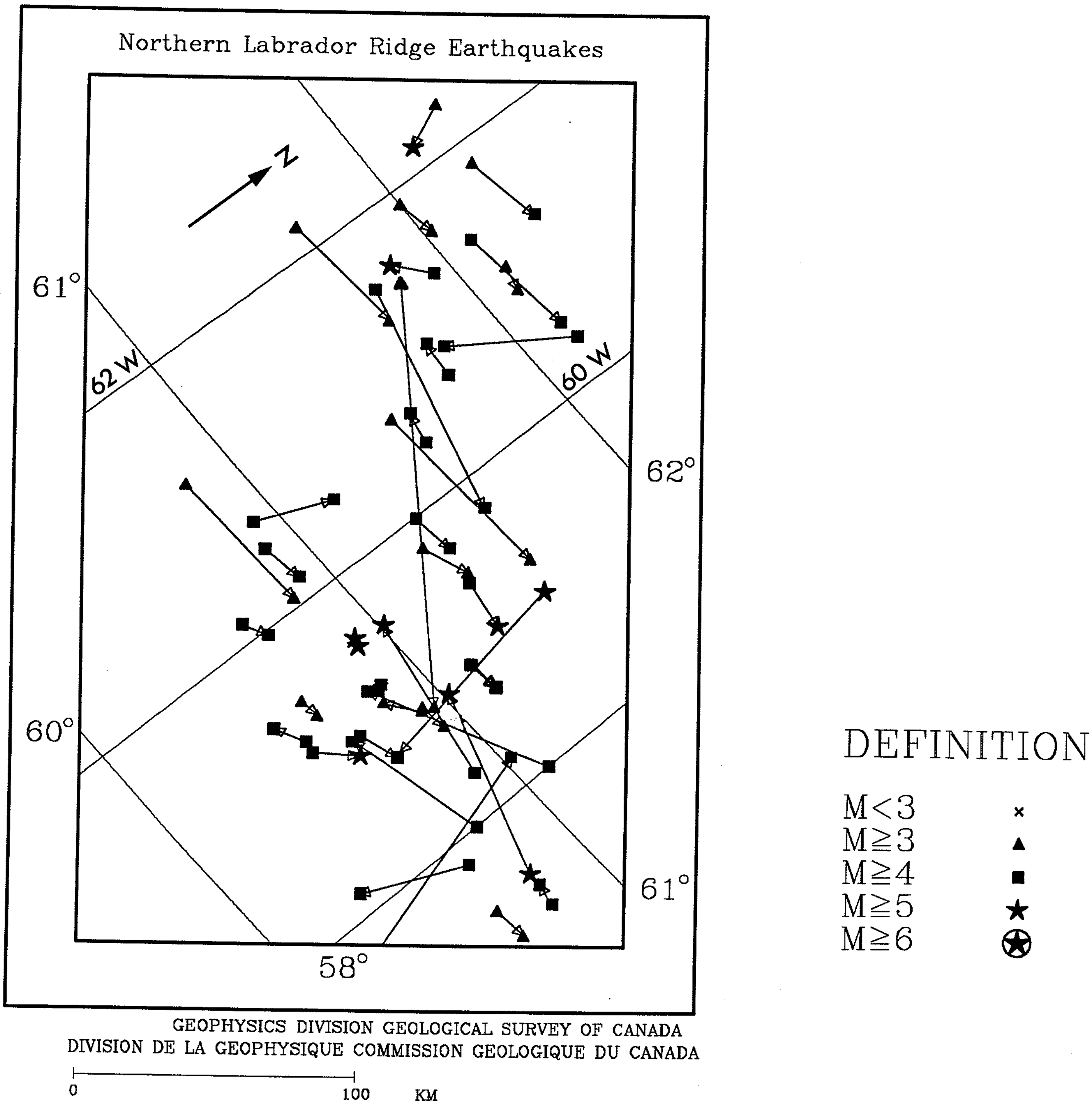
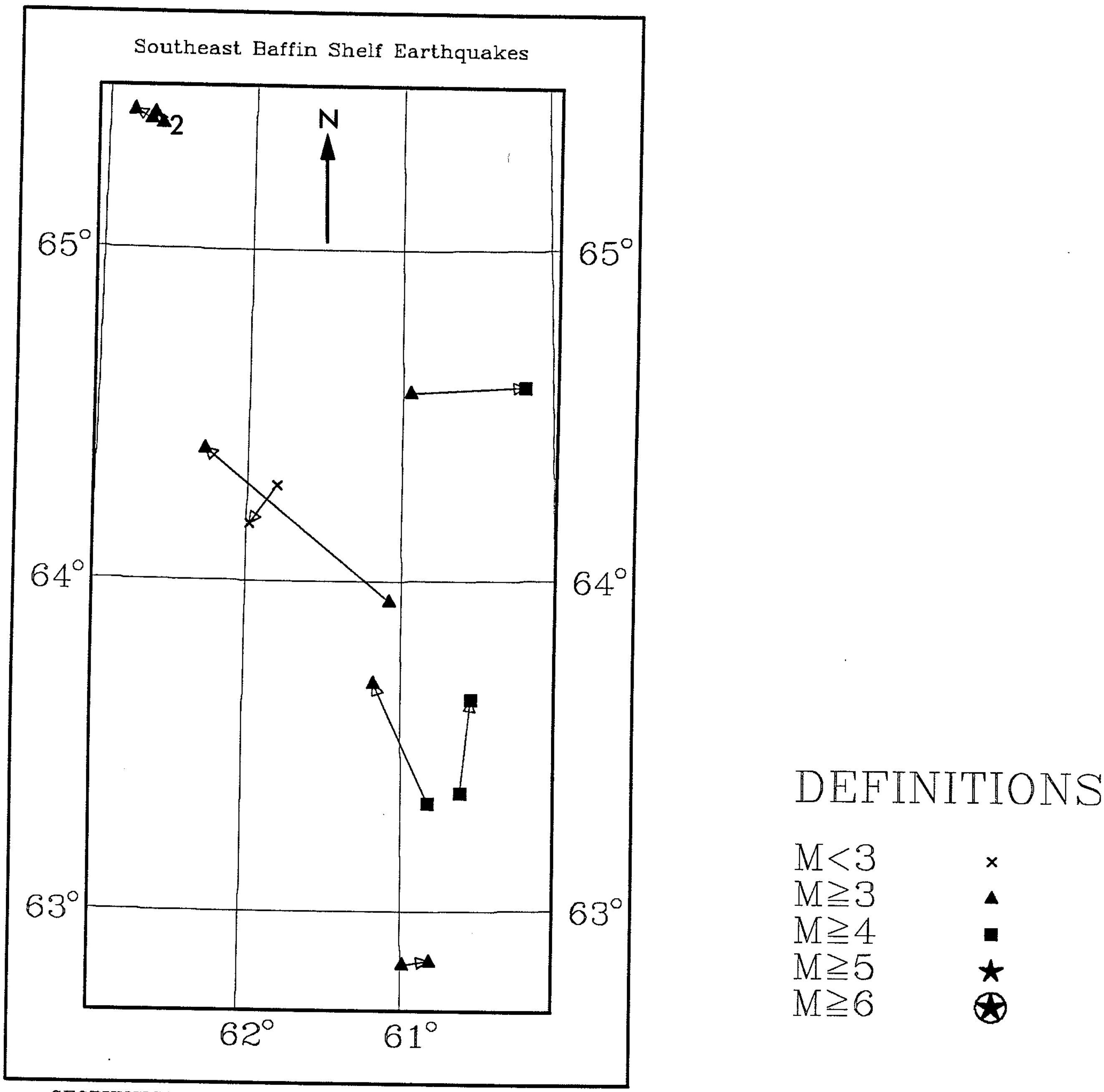


Figure 10 - The original and revised epicentres of earthquakes on the Southeast Baffin Shelf, connected by displacement vectors pointing toward the new locations.




GEOPHYSICS DIVISION GEOLOGICAL SURVEY OF CANADA
DIVISION DE LA GEOPHYSIQUE COMMISSION GEOLOGIQUE DU CANADA

0 100 KM

Figure 11 - The original and revised epicentres of earthquakes on the Labrador Shelf, connected by displacement vectors pointing toward the new locations.

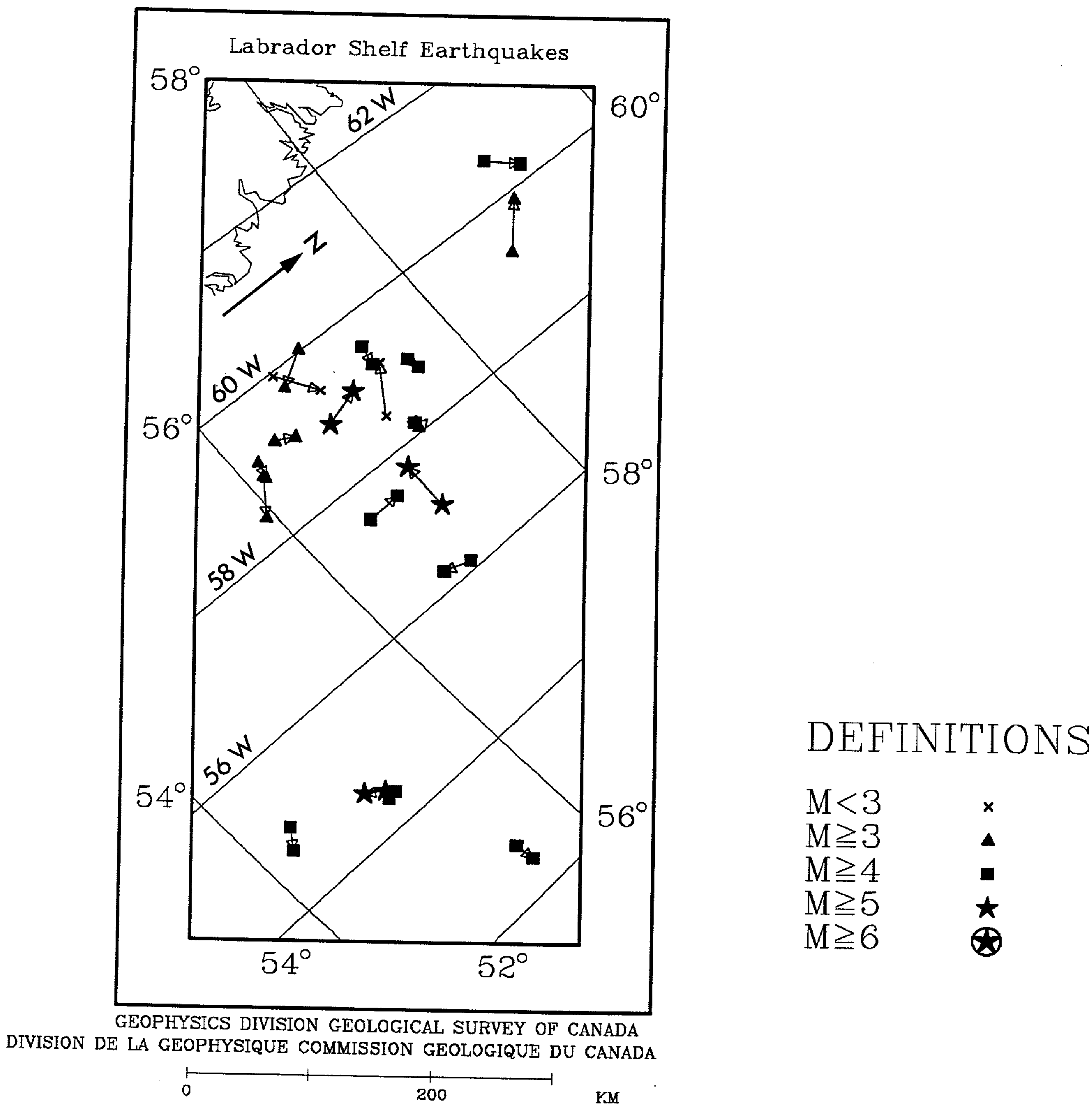
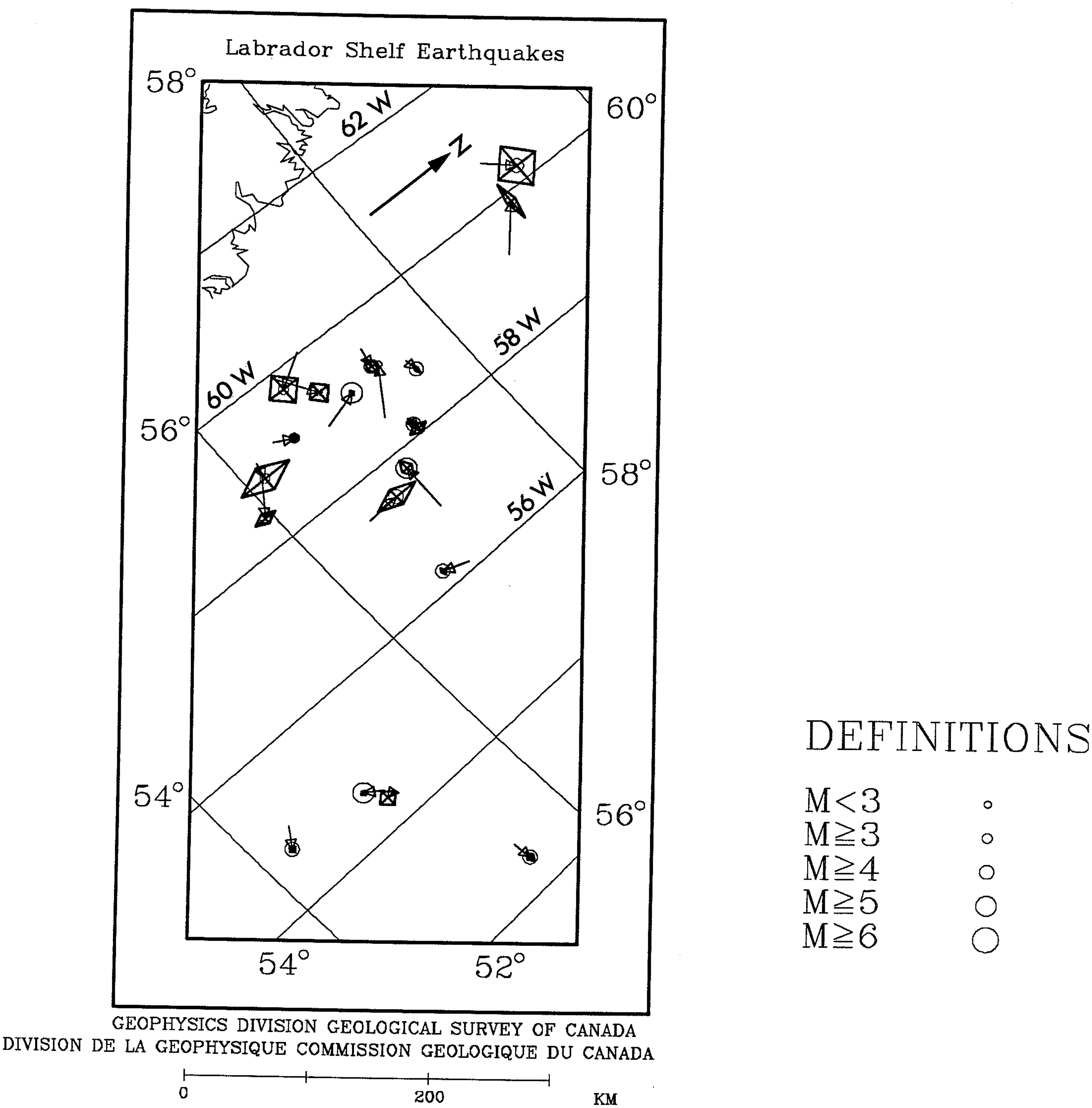


Figure 12 - The revised epicentres (open circles) of earthquakes on the Labrador Shelf together with their relocation vectors. The diamond-shaped boxes surrounding the epicentres indicate the errors in latitude and longitude.



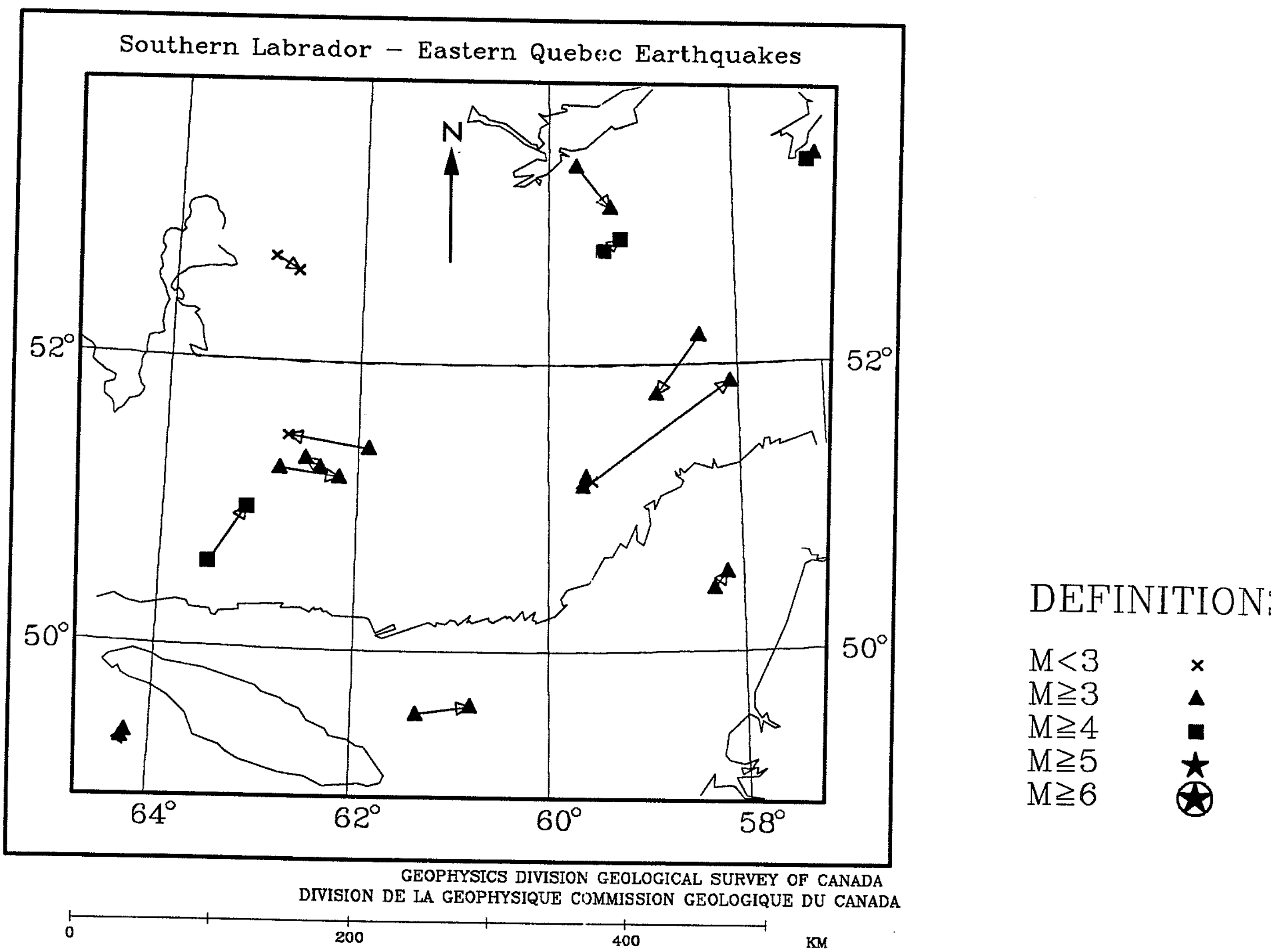



Figure 13 - The original and revised epicentres of earthquakes in southern Labrador and eastern Quebec, connected by displacement vectors pointing toward the new locations.

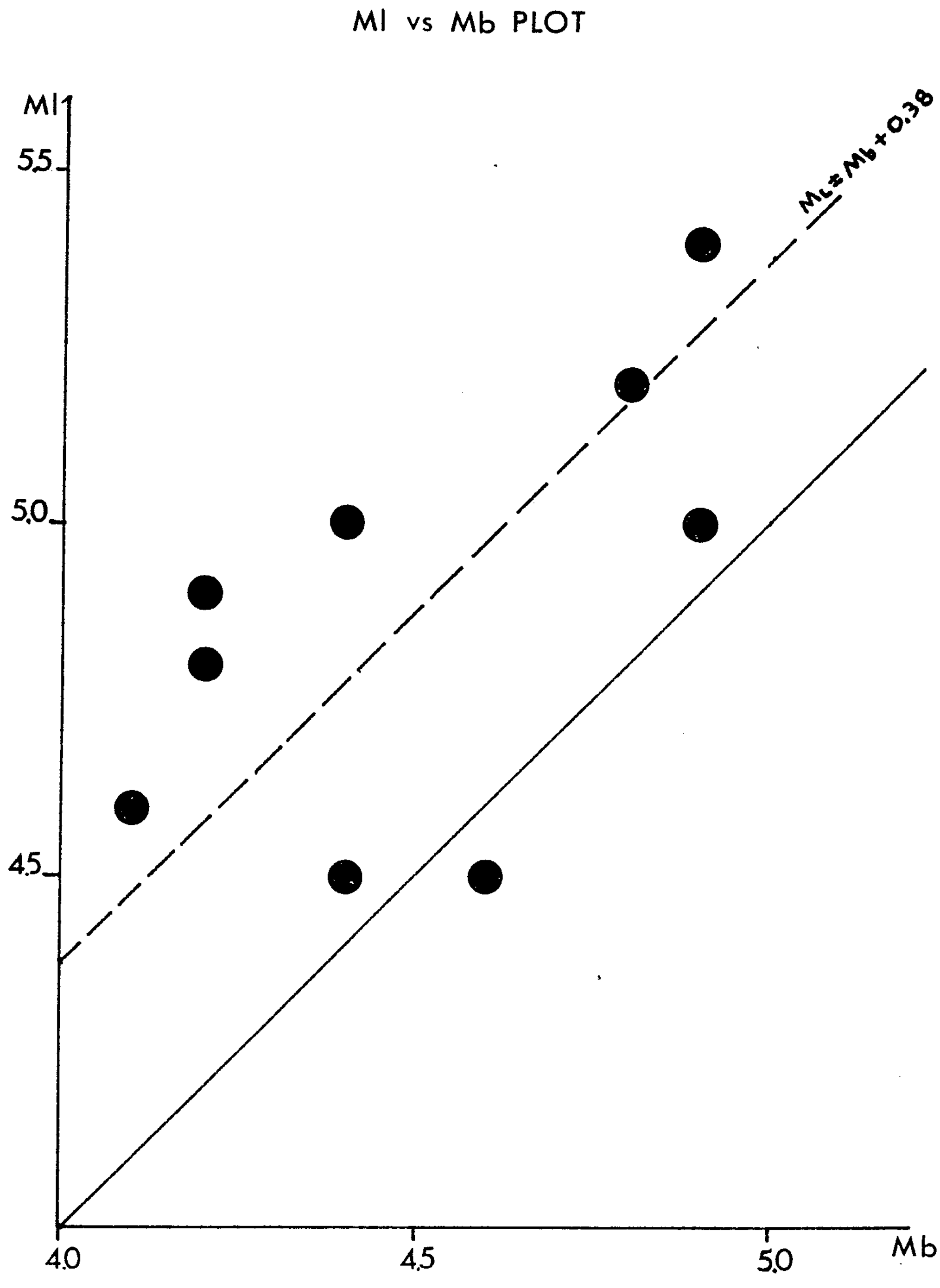
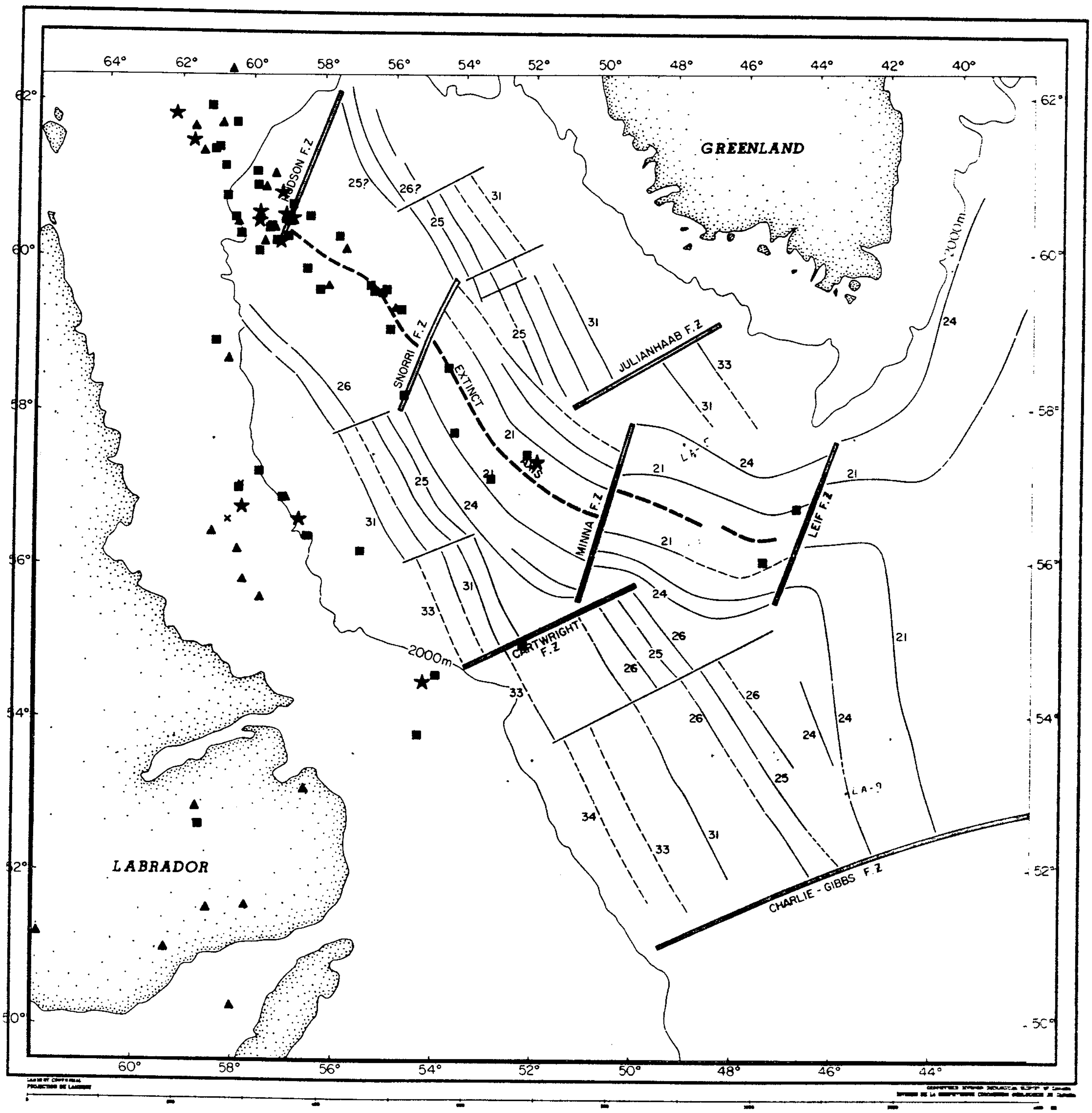



Figure 14 - Graph comparing the $M_L$ magnitudes to the $m_b$ magnitudes for nine Labrador Sea earthquakes. The solid line represents a linear relationship between the two scales with a slope of 1.0 and no bias. The dashed line is the chosen relationship with the same slope, but a bias of 0.38.

Figure 15 - Seismicity of the Labrador Sea showing the relationship between the relocated epicentres and the extinct ridge and fracture zones. (Base figure from Srivastava and Tapscott, 1986)



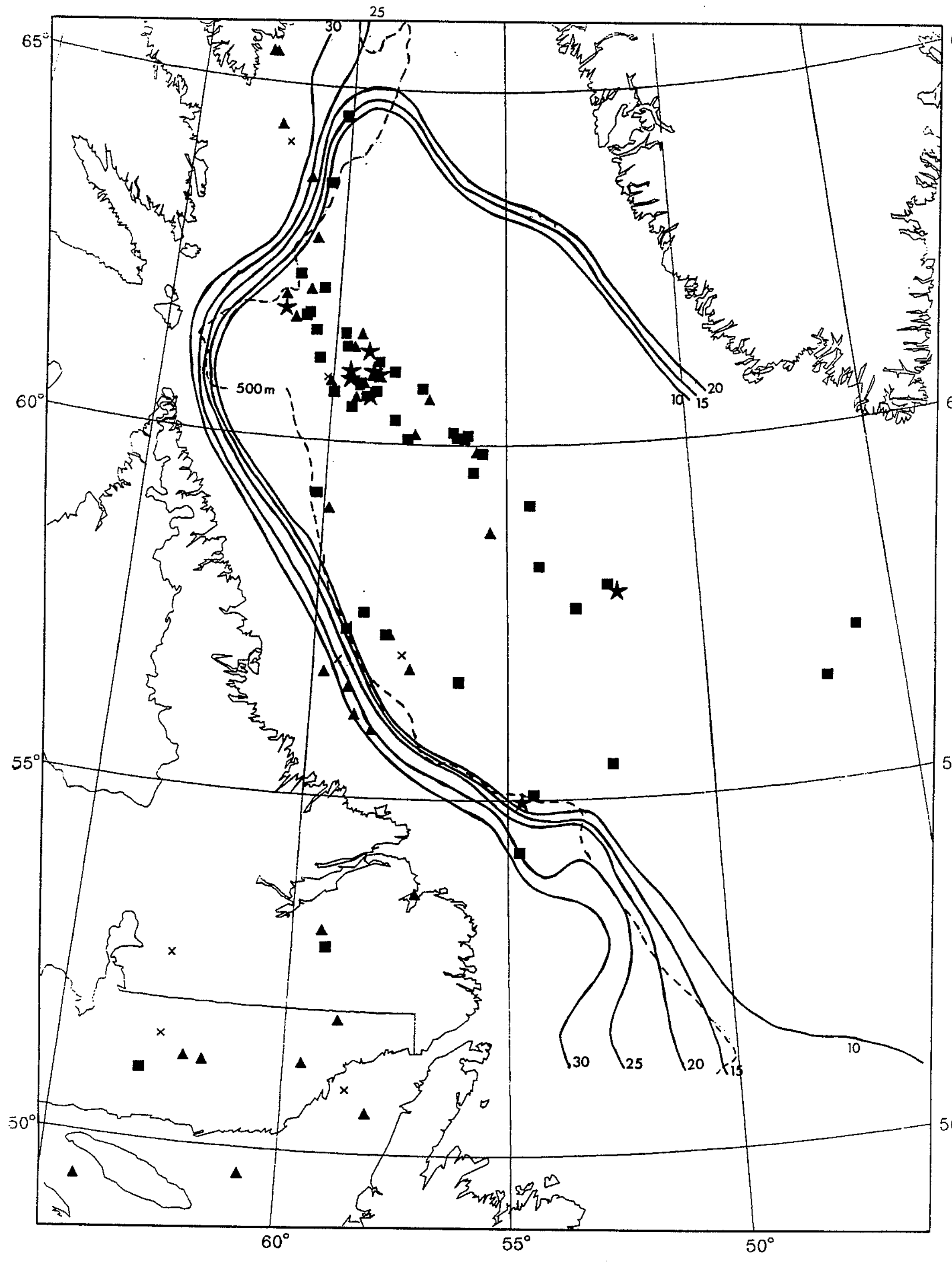
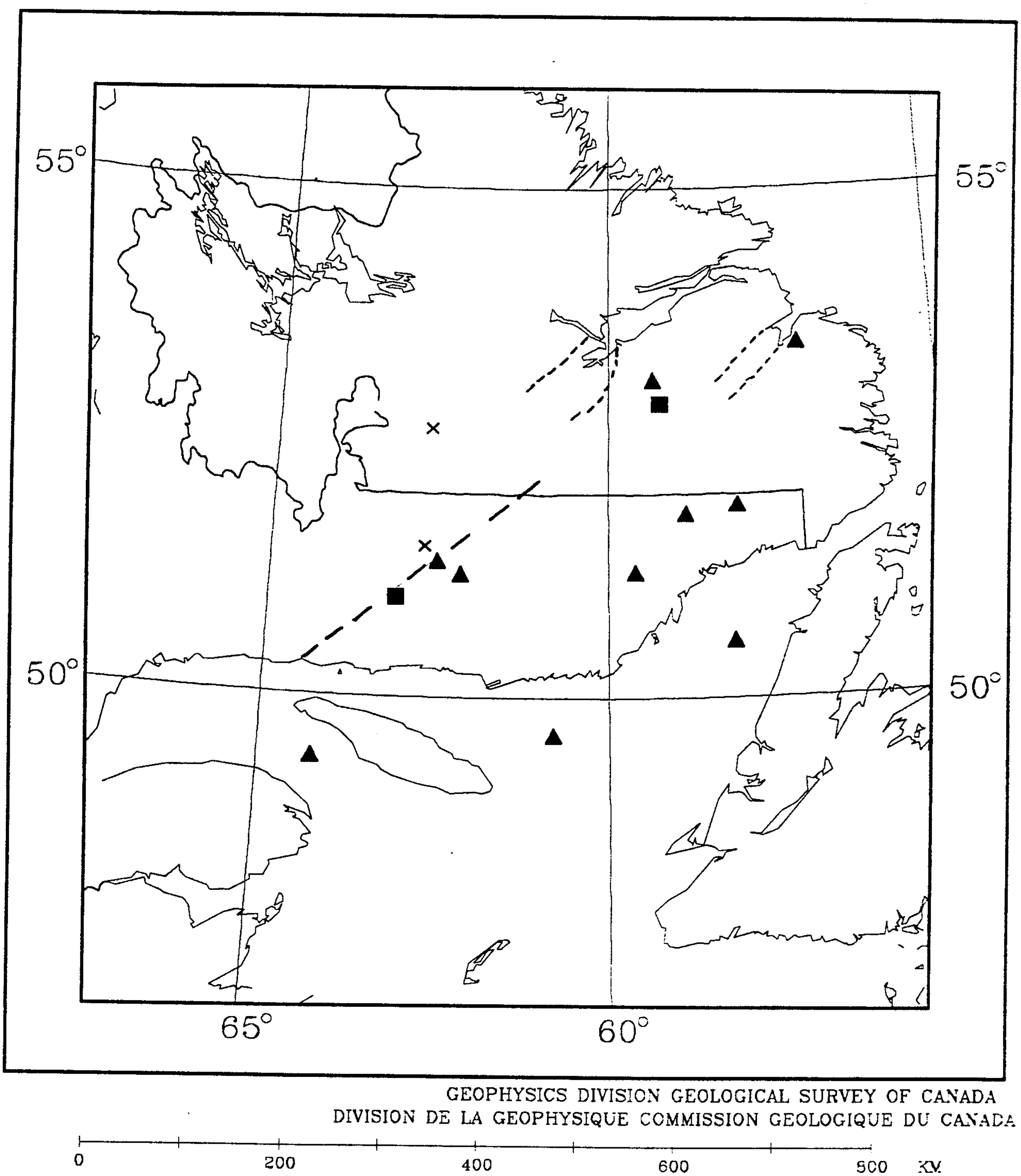



Figure 16 - Crustal thickness under the Labrador Sea, showing the rapid transition from the thin sea floor (> 10 km) to the thick continental crust (30 km) in approximately 50 km. (Crustal thickness data after Shih et al., 1988)

Figure 17 - Revised seismicity of southern Labrador and eastern Quebec showing the relationships of the relocated epicentres to faults (short dashed lines) and the aeromagnetic anomaly (long dashed line) sketched from Gower et al (1986).



## APPENDIX A

### Canadian Stations

| STATION CODE | LOCATION | LAT. (N) | LONG. (W) | ELEV. (M) |
|---|---|---|---|---|
| ALE | Alert, N.W.T. | 82.5033 | 62.3500 | 65 |
| BLC | Baker Lake, N.W.T. | 64.3160 | 96.0166 | 16 |
| CBK | Corner Brook, Newfoundland | 48.9197 | 57.9679 | 380 |
| CKO | Chalk River, Ontario | 45.9944 | 77.4500 | 190 |
| EBN | Edmundston, New Brunswick | 47.4620 | 68.2420 | 195 |
| EDM | Edmonton, Alberta | 53.2217 | 113.3500 | 730 |
| EEO | Eldee, Ontario | 46.6411 | 79.0733 | 398 |
| FBC | Frobisher Bay, N.W.T. | 63.7333 | 68.4667 | 45 |
| FCC | Fort Churchill, Manitoba | 58.7616 | 94.0866 | 39 |
| FFC | Flin Flon, Manitoba | 54.7250 | 101.9783 | 338 |
| FRB | Frobisher Bay, N.W.T | 63.7467 | 68.5467 | 18 |
| GAC | Glen Almond, Quebec | 45.7033 | 75.4783 | 62 |
| GBN | Guysborough, Nova Scotia | 45.4067 | 61.5133 | 38 |
| GGN | St. George, New Brunswick | 45.1170 | 66.8220 | 30 |
| GNT | Gentilly, Quebec | 46.3628 | 72.3722 | 10 |
| GRQ | Grand-Remous, Quebec | 46.6067 | 75.8600 | 290 |
| GSQ | Grosses Roches, Quebec | 48.9142 | 67.1106 | 398 |
| HAL | Halifax, Nova Scotia | 44.6377 | 63.5920 | 64 |
| HTQ | Hauterive, Quebec | 49.1917 | 68.3939 | 123 |
| IGL | Igloolik, N.W.T. | 69.3767 | 81.8067 | 38 |
| INK | Inuvik, N.W.T. | 68.3067 | 133.5200 | 40 |
| JAQ | La Grande-3, Quebec | 53.8022 | 75.7211 | 366 |
| KLC | Kirkland Lake, Ontario | 48.1447 | 80.0292 | 310 |
| KLN | McKendrick Lake, New Brunswick | 46.8433 | 66.3717 | 411 |
| LAQ | La Grande, Quebec | 53.8240 | 77.0200 | 183 |
| LGQ | La Grande-2, Quebec | 53.6917 | 77.7250 | 190 |
| LMN | Caledonia Mtn., New Brunswick | 45.8520 | 64.8060 | 363 |
| LMQ | LaMalbaie, Quebec | 47.5483 | 70.3267 | 419 |
| LPQ | La Pocatiere, Quebec | 47.3408 | 70.0094 | 126 |
| MBC | Mould Bay, N.W.T. | 76.2417 | 119.3600 | 15 |
| MNQ | Manicouagan, Quebec | 50.5333 | 68.7744 | 564 |
| MNT | Montreal, Quebec | 45.5025 | 73.6231 | 112 |
| MUN | St. John's. Newfoundland | 47.5717 | 52.7328 | 62 |
| OTT | Ottawa, Ontario | 45.3942 | 75.7167 | 77 |
| PBQ | Poste Baleine, Quebec | 55.2800 | 77.7400 | 20 |
| POC | La Pocatiere, Quebec | 47.3640 | 70.0410 | 61 |
| RES | Resolute, N.W.T | 74.6870 | 94.9000 | 15 |
| RSNT | Yellowknife | 62.4800 | 114.5920 | 191 |
| SBQ | Sherbrooke, Quebec | 45.3783 | 71.9264 | 265 |
| SCH | Schefferville, Quebec | 54.8183 | 66.7833 | 518 |
| SES | Suffield, Alberta | 50.3958 | 111.0417 | 770 |
| SFA | Seven Falls, Quebec | 47.1233 | 70.8267 | 232 |
| SHF | Shawinigan Falls, Quebec | 46.5517 | 72.7633 | 60 |
| SIC | Sept-Iles, Quebec | 50.1720 | 66.7380 | 283 |
| SLQ | Saint Louis du Ha Ha, Quebec | 47.6662 | 69.0103 | 320 |
| STJ | St. John's. Newfoundland | 47.5717 | 52.7328 | 62 |

| | | | | |
|---|---|---|---|---|
| SUD | Sudbury, Ontario | 46.4660 | 80.9660 | 267 |
| TRQ | Mont-Tremblant, Quebec | 46.2222 | 74.5556 | 853 |
| UNB | Fredericton, New Brunswick | 45.9500 | 66.6300 | 56 |
| VDQ | Val d'Or, Quebec | 48.2300 | 77.9717 | 305 |
| WBO | Williamsburg, Quebec | 45.0003 | 75.2750 | 85 |
| WEO | Welcome, Quebec | 44.0186 | 78.3744 | 149 |
| YKA | Yellowknife, N.W.T. | 62.4933 | 114.6050 | 196 |

Greenland Stations

| | | | | |
|---|---|---|---|---|
| DAG | Danmarkshavn | 76.7700 | 18.6500 | 30 |
| GDH | Godhavn | 69.2500 | 53.5333 | 23 |
| IVI | Ivigtut | 61.2000 | 48.1833 | 20 |
| KTG | Kap Topin | 70.4167 | 21.9833 | 60 |
| NOR | Nord | 81.6000 | 16.6833 | 36 |
| SCO | Scoresbysund | 70.4833 | 21.9500 | 69 |

American Stations

| | | | | |
|---|---|---|---|---|
| BMO | Blue Mountain Array, Oregon | 44.8483 | 117.3050 | 1189 |
| CBM | Caribou, Maine | 46.9325 | 68.1208 | 250 |
| HHM | Hungry Horse, Montana | 48.3494 | 114.0275 | 1100 |
| LAO | LASA Array, Montana | 46.6886 | 106.2222 | 744 |
| MIN | Milo, Maine | 40.3450 | 121.6050 | 1495 |
| RSNY | Adirondack, New York | 44.5480 | 74.5300 | 396 |
| UBO | Unita Basin Array, Utah | 40.3217 | 109.5687 | 1596 |
| WES | Weston, Massachusetts | 42.3847 | 71.3221 | 60 |

## APPENDIX B

### PIK FILE FORMAT

The PIK file is the input file to and also the output file (one version newer) from the CANSESS MULTILAYER epicenter location program (LOC). SAM PIK (or PK4) command generates a PIK file automatically for the event. These PIK files can be modified/created by the EPK program or by the DEC text editor EDT.

It contains four types of records:

1. ESR - earthquake solution record.
2. ECR - earthquake comment record.
3. ODR - observed data record.
4. CDR - calculated data record.

The ESR must be the first line in the file. If the file is being located for the first time, it will be created by LOC. Otherwise it will be the output of a previous LOC.
The ECR records, containing remarks, must come before the first ODR. There is only one ODR per station, and each is followed by a CDR, which contains the calculated results for this station. The detail layout of these records is:

#### EARTHQUAKE SOLUTION RECORD (ESR)

(solution record has "+" or "-" in col.1 and "M" in Col. 18)

```
COLS   ENTRY    FORMAT  DEFINITION
====   =====    ======  ==========

1-1    +        A1      PRIME SOLUTION BY EPB
       -                PRIME SOLUTION BY OTHER AGENCY
       0                SUPPLEMENTARY SOLUTION
2-7    45.233   F6.3    NORTH LATITIDE, DEGREES
8-15   -123.300F8.3     LONGITUDE, DEGREES
16-16           A1      HYPOCENTRE QUALITY INDICATOR.
       O                POOR QUALITY SOLUTION
       F                GOOD QUALITY SOLUTION
17-17           I1(A1)  OBSERVED DATA FORMAT INDICATOR,
       BLANK            PRE-1979 DATA FORMAT USED
       1                1979 DATA FORMAT USED.
18-19           A2      PRIME MAGNITUDE TYPE
       ML               RICHTER
       MLE              EBEL
       MN               NUTTLI (DEFAULT)
       MLG              H. & K.
       MB               BODY-WAVE
       MS               SURFACE WAVE
       MC               CODA LENGTH
20-20    BLANK
21-23  3.1      F3.1    AVERAGE PRIMARY MAGNITUDE VALUE
24-24    BLANK
25-26  18       I2      ORIGIN TIME HOUR, U.T.
27-28  23       I2      ORIGIN TIME MINUTE
29-31  323      I3      ORIGIN TIME SECOND*10
32-32    BLANK
33-34  12       I2      DAY
35-36  03       I2      MONTH
37-40  1979     I4      YEAR
41-41    BLANK
42-42  2        I1      STANDARD DEVIATION ORIGIN TIME, SECONDS
43-47  0.122    F5.2    STD ERROR IN LATITUDE, DEGREES
48-52  0.333    F5.2    STD ERROR IN LOGITUDE, DEGREES
53-53    BLANK
54-56  0.3      F3.1    STD ERROR IN MAGNITUDE FOR EPB
       XXX      A3      AGENCY CODE FOR EXT. MAG, DEPENDS ON COL. 1
57-59  34       I3      NUMBER OF STAIONS USED FOR HYPOCENTER
60-62  14       I3      NUMBER OF PHASES USED FOR THIS HOPOCENTER.
63-65  14       I3      NUMBER OF AMPLITUDE USED FOR MAGNITUDE.
66-69  0.33     F4.2    RMS OF HYPOCENTER SOLUTION, SECONDS.
70-70           A1      SUOLUTION TYPE INDICATOR
       BLANK            FIXED DEPTH.
       Z                FREE DEPTH
       X                NO ACTION FOR THE WHOLE FILE
       N                ASSIGNED HYPOCENTER AND TIME
       H                ASSIGNED HYPOCENTER,
                          BUT CALCULATED ORIGIN TIME.
71-71           I1      AGENCY CODE
       1                USGS
       2                EPB
       3                PGC
       4                SEA    UNIVERSITY OF WASHINGTON
       5                NEIS   NATIONAL EARTHQUAKE INFORMATION CENTER
       6                ISC    INTERNATIONAL SEISMOLOGICAL CENTER
       7                LDGO   LAMONT-DOHERTY GEOLOGICAL OBSERVATORY
       8                WES    WESTON GEOPHYSICAL OBSERVATORY
       9                UAGI   UNIV. OF ALASKA, GEOPHYSICAL INSTITUTE
72-76  18.33    F5.2    FOCAL DEPTH, KM
                        IF AND ONLY IF COL.70 =Z, FREE DEPTH SOLUTION
77-80    30     I4      STD ERROR IN DEPTH, IN 100rds OF METERS
81-82    03       I2      MODEL NUMBER
83-85    ML=    A3      SECONDARY MAGNITUDE TYPE
86-88    1.3    F3.1    SECONDARY MAGNITUDE VALUE
89-91    008    I3      NUMBER OF STATIONS USED TO CALCULATE SEC. MAG.
92-92    1      I1      MULTILAYER HYPO SIMULATION FLAG, 0-OFF, 1-ON.
93-93             A1                                      ! FL001
         F                FELT                            ! FL001
         N," "            NOT FELT                        ! FL001
94-95    10       I2      NB. OF ASSOCIATED EVENTS        ! FL001
96-96             A1                                      ! FL001
         L              LOCAL EARTHQUAKE
         B                MINE BLAST
         R                ROCKBURST
         P                POSSIBLE ROCKBURST
       X                CONTROLLED EXPLOSIONS
97-100   3.56     F4.2    S VELOCITY USED BY SINGLE LAYER MODEL  ! FL001

<      FORMAT(A1,F6.3,F8.3,2A1,A2,1X,F3.1,1X,I2.2,I2.2,I3.3,1X,2I2.2,
<      &         '19',I2.2,1X,I1,2F5.3,1X,A3,           ! FOR AGENT_CODE
<      &         '19',I2.2,1X,I1,2F5.3,1X,F3.1,         ! FOR STD_MAG>
<      &         3I3.3,F4.2,A1,I1,F5.2,I4,T81,I2,'MC=',F3.1,I3,I1,>
<      &  A1,I2,A1,F4.2)                                      >
```

## EARTHQUAKE COMMENT CARDS (ECR)

```
COLS   ENTRY   FORMAT  DEFINITION
====   =====   ======  ==========

1-40           40A1    EARTHQUAKE DESCRIPTION IN ENGLISH
41-80          40A1    EARTHQUAKE DESCRIPTION IN FRENCH
```

## OBSERVED DATA RECORD (ODR)

```
COLS   ENTRY   FORMAT  DEFINITION
====   =====   ======  ==========

1-5    OTT     A5      STATION CODE      ! FL001
6-7    79      I2      YEAR              ! FL001
8-9    12      I2      MONTH             ! FL001
10-11  23      I2      DAY               ! FL001
12-13  12      I2      HOUR, U. T.       ! FL001
14-15  14      I2      MINUTE OF 1ST P PHASE, NOT NEC. @ THIS STN
16-16          A1      INSTRUMENT CODE                  ! FL001
       P               SHORT PERIOD INSTRUMENT READ
       L               LONG PERIOD INSTRUMENT
                          READ,AMP. & 1ST MOTION DATA ONLY
17-17    BLANK                                           ! FL001
18-18            A1      PN WEIGHT                       ! FL001
         " "             USED IN CALCULATION
         X               NOT USED IN CALCULATION
19-19          A1      PN QUALITY DESIGNATOR            ! FL001
       A               SHARP CLEAR BEGINNING    (+- 0.25 SEC.)
       B," "           GOOD BEGINNING           (+- 1.0 SEC.)
       C               WEAK POOR BEGINNING      (+- 4.0 SEC. OR MORE )
       X               PHASE NOT USED IN SOLUTION, LARGE  RESIDUAL.
       0               PHASE NOT READ
20-21  14      I2      MINUTE OF PN ARRIVAL             ! FL001
22-25  2341    F4.2    SECOND OF PN ARRIVAL             ! FL001
26-28  CNW     3A1     FIRST MOTION OF PN ARRIVAL       ! FL001
29-33  +0.03   F5.0??  TIME CORRECTION                  ! FL001
34-34            A1      PG WEIGHT                       ! FL001
         " "             USED IN CALCULATION
         X               NOT USED IN CALCULATION
35-35  A,B..   A1      PG QUALITY DESIGNATOR, SEE 19    ! FL001
36-37  14      I2      MINUTE OF PG ARRIVAL             ! FL001
38-41  264     F4.2    SECOND OF PG ARRIVAL             ! FL001
42-44  DSE     3A1     FIRST MOTION OF PG ARRIVAL       ! FL001
45-45            A1      SN WEIGHT                      ! FL001
         " "             USED IN CALCULATION
         X               NOT USED IN CALCULATION
46-46  A,B...  A1      SN QUALITY DESIGNATOR, SEE 19    ! FL001
47-48  14      I2      MINUTE OF SN ARRIVAL             ! FL001
49-52  52      F4.2    SECOND OF SN ARRIVAL                   ! FL001
53-53            A1      LG WEIGHT                            ! FL001
         " "             USED IN CALCULATION
         X               NOT USED IN CALCULATION
54-54  A,B...  A1      LG QUALITY DESIGNATOR, SEE 19          ! FL001
55-56  14      I2      MINUTE OF LG ARRIVAL                   ! FL001
57-60  589     F4.2    SECOND OF LG ARRIVAL                   ! FL001
61-61    BLANK                                                ! FL001
62-64  031     F3.2    PERIOD OF MAX. TRACE AMPLITUDE, SEC. ! FL001
65-68  150     F4.0    MAGNIFICATION OF INSTRUMENT
                           AT GIVEN PERIOD, IN 1000.
69-72  125     F4.1    TRACE AMPLITUDE
                           (ONE-HALF MAX. PEAK-TO-PEAK) IN MM
73-73    BLANK                                                ! FL001
74-77          I4      DURATION IN SECONDS.                   ! FL001
78-79    BLANK                                                ! FL001
80-80                  I1      MAGNITUDE CODE                    ! FL001
       BLANK           AMPLITUDE SUITABLE FOR NUTTLI OR RICHTER SCALE
       1               AMPLITUDE SUITABLE FOR RICHTER ONLY;
                           CORDILLERN PATH
       2               AMPLITUDE SUITABLE FOR EBEL
       3               AMPLITUDE UNRELIABLE, NOT USED FOR MAGNITUDE
       4               AMPLITUDE SUITABLE FOR HUEM & KISCO
       5               AMPLITUDE SUITABLE FOR MS SCALE ONLY
       8               SN AMPLITUDE READ, USE RICHTER SCALE ONLY
                           BEYOND 600 KM IF REQUIRED
81-83    BLANK                                                ! FL001
84-85    15    I2      MINUTE OF THE MAX. AMPLITUDE           ! FL001
86-89  155     F4.2    SECONDS OF THE MAX. AMPLITUDE          ! FL001

<     FORMAT(A5,5I2,A1,1X,2A1,I2,F4.2,A3,F5.0,2A1,I2,F4.2,A3,2A1>
<     &           I2,F4.2,2A1,I2,F4.2,1X,F3.2,F4.0,F4.1,1X,I4,2X,I1,
<     &           3X,I2,F4,2)
```

## CALCULATED DATA RECORD (CDR)

```
COLS   ENTRY     FORMAT  DEFINITION
====   =====     ======  ==========

1-5    OTT       A3      STATION CODE                        ! FL001
6-6    BLANK
7-8    NW        A2      QUADRANT OF STATION
9-9    BLANK
10-13  1305      I4      EPICENTRAL DISTANCE, KM
14-15  KM        A2      RECORD FLAG
16-16  BLANK
17-18  28        F2.1    PN WEIGHT USED FOR CALCULATIONS ! FL001
19-23  0107      F5.2    PN RESIDUAL, SECOND                 ! FL001
24-24  BLANK,#   A1      LARGE RESIDUAL FLAG                 ! FL001
25-27  235       I3      AZIMUTH TO STATION, DEGREES
28-30  049       I3      EMERGENT ANGLE
                         PN POSITIVE
```

```
                              PG NEGATIVE
31-34 BLANKS
35-36 14        F2.1     PG WEIGHT                          ! FL001
37-41 -091      F5.2     PG RESIDUAL, SECOND                ! FL001
42-42 BLANK,#   A1       LARGE RESIDUAL FLAG                ! FL001
43-45 BLANKS
46-47 07        F2.1     SN WEIGHT                          ! FL001
48-52 0024      F5.2     SN RESIDUAL, SECOND                ! FL001
53-53 BLANK,#   A1       LARGE RESIDUAL FLAG                ! FL001
54-55 07        F2.1     SG WEIGHT                          ! FL001
56-60 -434      F5.2     SG RESIDUAL, SECOND                ! FL001
61-61 BLANK,#   A1       LARGE RESIDUAL FLAG                ! FL001
62-63 BLANKS
64-70 0001356 I7         GROUND VELOCITY, NM/SEC
71-71 BLANK
72-73 35        F2.1     RICHTER OR SURFACE WAVE MAGNITUDE
74-75 ML,MS     A2       MAGNITUDE DESIGNATOR
76-77 34        F2.1     NUTTLI MAGNITUDE
78-79 MN        A2       MAGNITUDE DESIGNATOR


<      FORMAT(A5,1X,A2,1X,I4.4,'KM',1X,F2.1,F5.2,A1,2I3.3,>
<      &         4X,F2.1,F5.2,A1,3X,F2.1,F5.2,A1,F2.1,      >
<      &         F5.2,A1,2X,I7.7,1X,2(F2.1,A2))            >
```

# APPENDIX C

## COMPUTER DATA FILES ('PIKFILES')

(Organized by region, and then chronologically)

```
**************************************************
*                                                *
*         LABRADOR RIDGE EARTHQUAKES             *
*                                                *
**************************************************


+60.764- 58.749O MS=5.6 0634282 15061934 00.2430.332 0.0  5  7  02.53 218.00   0 1ML=0.0  00  0 3.65
$ 61.5  59.0  MS=5.6  CEEF
$ 61.4  59.1  ISC
$ LABRADOR RIDGE
$ ISC HAS ADDITIONAL PHASES ON TELESEISMIC STATIONS.
$ ISC GIVES NO MAGNITUDE.  WHAT WAS THE SOURCE OF THE MS 5.6?
$ OTTAWA S 4 SEC TOO EARLY FOR SN.
$ SEEMS AN ACCEPTABLE LOCATION GIVEN THE UNCERTAINTIES
$
IVI  3406150634P   3545                   3639
IVI   E  0574KM 10  097 081 49           10 -080            0000000 00ML00MN
SCO  3406150634P   3830                  X4206
SCO   NE 1969KM 10 -230 041 47           00 2953$           0000000 00ML00MN
OTT  3406150634P   3842                   4148
OTT   SW 2043KM 10  165 221 47           10 -420            0000000 00ML00MN
FOR  3406150634P   3925                  X4331
FOR   SW 2446KM 10  415 212 39           00 1300$           0000000 00ML00MN
ORT  3406150634P  X3907                  X4250
ORT   SW 3307KM 00 ****$225 33           00 ****$           0000000 00ML00MN
PAS  3406150634P   4251
PAS   W  5122KM 10  052 263 29                              0000000 00ML00MN
             Z

+57.898- 52.151F ML=5.3 0806361 04021958 00.0770.214 0.2  8 11  20.85 218.00   0 1MN=0.0  00  0 3.65
$+57.9  - 53.5    ML=5.1 CEEF
$ LABRADOR RIDGE
$ BCIS HAS MORE TELESEISMIC ARRIVALS
$ COPIES OF NOR, SCO FROM GREGERSEN
$ WES FROM BCIS
$
SFA  5802040806P   1011                   1253                16      8 1
SFA   SW 1736KM 07 -253 234 49           07 -181            0000000 00ML00MN
SHF  5802040806P   1029                   1327             70  19  10      8 1
SHF   SW 1879KM 07 -118 237 50           07  166            0000472 55ML42MN
SCO  5802040806P  B1044                                                  1
```

```
SCO    NE 1994KM 07  101 033 47                                     0000000 00ML00MN
MNT   5802040806P    1045                       1355                70  90  21        8 1
MNT    SW 2012KM 07  013 236 47                07  149              0000209 52ML39MN
OTT   5802040806P    1058                                         400  .6    8        8 1
OTT    SW 2126KM 07  091 239 45                                     0002094 00ML49MN
WES   5802040806P  X1109                        1432                                    1
WES    SW 2189KM 00  538 226 43                07  077              0000000 00ML00MN
RES   5802040806P  A11405                                                             8 1
RES    NW 2577KM 26 -003 333 37                                     0000000 00ML00MN
NOR   5802040806P    12057                    XB16515                                   1
NOR    N  2870KM 07  019 011 34                00 -456              0000000 00ML00MN
SLC   5802040806P  X1420                                                                1
SLC    W  4560KM 00  220 272 30                                     0000000 00ML00MN
COL   5802040806P  X1428                                                                1
COL    NW 4678KM 00  167 321 30                                     0000000 00ML00MN
EUR   5802040806P  X1446                                                                1
EUR    W  4907KM 00  277 274 29                                     0000000 00ML00MN
TUC   5802040806P  X1508                                                                1
TUC    W  5199KM 00  415 263 28                                     0000000 00ML00MN
               Z

+61.027- 58.2250 ML=4.8 0131042 03081962 00.0000.000 0.0  2  3  10.00 218.00   0 1MN=0.0   00  0 3.65
$+52    -54.2      ML=4.8 CEEF AFTER SMITH
$ LABRADOR RIDGE (PROBABLY)
$ NEEDS GREENLAND STATIONS AND RES, MBC, ALE, PNT.
$
$ SMITH'S COMMENTS
$  SCH CLEAR PN AND SN; NO LG - OCEANIC EVENT
$  HAL (SN) TRACE "VERY SMALL AND MAY NOT BE ASSOCIATED".
$  WESTERN EPICENTRE NOT POSSIBLE BECAUSE OF LACK OF RECORDS ON SOUTHERN STATIONS.
$
$ WAHLSTROM COMMENTS:
$  HAL: READ AT LAMONT, LARGE T.C. CONFIRMED WITH TELESEISM, CHECK AGAIN FOR S.
$  SCH: ARR. TIMES AND AMP/PER FROM SMITH CONFIRMED (ROUGHLY) BY MICROFILM,
$       RECORD NOT FOUND? (CHECK)
$  SFA: MICROFILM NOT FOUND, RECORD NOT FOUND, INTERMITTENT OPERATION
$  SHF: NO SIGNAL FROM MICROFILM, RECORD NOT FOUND? (CHECK)
$  OTT: STATION DISCONNECTED.
$  MNT: POSSIBLE S PHASE AT 3904 ON EW, NOT ON NS. TOO LATE FOR SN
$
$ ADAMS COMMENTS
$  NO TRACE OF SECOND (EARLIER OR LATER) PHASE ON HAL
$  HAL PHASE RE-INTERPRETED AS PN, PLACES EPICENTRE ON LABRADOR RIDGE.
$  CURRENT EXPERIENCE SUGGESTS SMITH EPICENTRE JUST N OF NEWFOUNDLAND
$    SHOULD HAVE GENERATED LG ON SCH
$  RIDGE LOCATION IS CONSISTANT WITH OCEANIC PATH FOR SCH.
$  RIDGE IS LOCUS OF MANY EARTHQUAKES; SMITH'S LOCATION IS HIGHLY UNUSUAL.
$  ABSENCE OF SN ON HAL IS STILL PUZZLING.
$  COMPARE WITH ML=5.1 EVENT ON 621026. THIS EVENT ALSO LACKS HAL SN READING
$    THOUGH AS IT WAS LARGER HAD PN ON SHF AND RES TO CONFIRM NORTHERN EPICENTRE.
$
$
SCH  6208030132P   32545                        3416              30 175 150       8 1
```

```
SCH   SW 0857KM 10  000 220 49          10  000          0001795 48ML42MN
HAL  6208030132P   3456                                                    1
HAL   S  1860KM 10  000 193 50                            0000000 00ML00MN
MNT  6208030132P                        X3904
MNT   SW 2001KM         217 47          00 4474$          0000000 00ML00MN
             Z

+61.018- 58.857F ML=5.1 1029229 26101962 00.0870.419 0.3  4  6  31.01 218.00   0 1MN=0.0  00  0 3.65
$+60.8  - 57.5   ML=5.0 CEEF
$ LABRADOR RIDGE
$ NOT IN ISS
$ NO LG PHASES.
$ SCH PN AMPLITUDE SIMILAR TO SN
$ MBC AND COL PHASES APPEAR TO NOT BE ASSOCIATED WITH THIS EVENT.
$ COMPARE WITH 620803
$
SCH  6210261029P  A3111                 A3230            40 157 150        8 1
SCH   SW 0835KM 16  043 218 49          16 -004           0001501 49ML41MN
SHF  6210261029P   33095                X35555                             8 1
SHF   SW 1846KM 04 -369 215 50          00 -957           0000000 00ML00MN
HAL  6210261029P   3311                                  30  42  19        8 1
HAL   S  1851KM 04 -280 192 50                            0000947 55ML45MN
RES  6210261029P   3343                  3655           100  88  15        8 1
RES   NW 2091KM 04  273 331 45          04 -218           0000107 49ML36MN
MBC  6210261029P  X3458                                                    8 1
MBC   NW 2794KM 00 1195$331 35                            0000000 00ML00MN
COL  6210261029P  X3649                                                    1
COL   NW 4165KM 00 1415$315 31                            0000000 00ML00MN
             Z

+58.748- 55.454O ML=4.4 0212024 30111962 00.0000.000 0.0  2  3  10.00 218.00   0 1MN=0.0  00  0 3.65
$ 58.8 54.8  ML=4.5   CEEF
$ LABBRADOR RIDGE
$ SCH - NO LG SO SMITH CHOSE LABRADOR SEA OVER JAMES BAY.
$
SCH  6211300212P   1348                  1506            30 178  70        8
SCH   SW 0819KM 10  000 243 49          10  000           0000824 44ML39MN
GDH  6211300212P
GDH   N  1176KM         004 49                            0000000 00ML00MN
RES  6211300212P   1651
RES   NW 2404KM 10  000 333 39                            0000000 00ML00MN
             Z

+61.014- 59.530O ML=5.0 1400580 02121962 00.0250.220 0.4  3  5  20.30 218.00   0 1MN=0.0  00  0 3.65
$+60.9  - 58.3   ML=4.5 CEEF
$ LABRADOR RIDGE
$
SCH  6212021400P  A0243                  0400            30 182 120        8 1
SCH   SW 0813KM 20  008 215 49          05 -039           0001381 47ML41MN
HAL  6212021400P   0447                                                    8 1
HAL   S  1844KM 05 -097 190 50                            0000000 00ML00MN
```

```
RES   6212021400P   0514                          0828           50 226  60        8 1
RES    NW 2074KM 05  057 331 45                  05 -053          0000334 53ML41MN
             Z

+60.848- 60.072O ML=3.6 1553037 22021964 00.1010.751 0.6  2  4  21.25 218.00   0 1MN=0.0  00  0 3.65
$ 60.83  61.17  ML=3.5  CEEF
$ LABRADOR RIDGE
$
FBC   6402221553P   54170                         55074          40 115   9        8 1
FBC    NW 0542KM 10  153 310 49                  10 -087          0000123 32ML27MN
SCH   6402221553P   54432                         56002          30 100  16        8 1
SCH    SW 0781KM 10 -152 214 49                  10  088          0000335 40ML34MN
GDH   6402221553P                                                                  8 1
GDH    N  0986KM          015 49                                  0000000 00ML00MN
             Z

+61.537- 59.247O ML=3.8 1557395 22021965 00.0000.000 0.4  2  3  20.00 218.00   0 1MN=0.0  00  0 3.65
$ 61.50  60.67  ML=3.7  CEEF
$ LABRADOR RIDGE
$ FBC CARD HAS DATA PROBABLY FOR PN AMPLITUDE: 0.4 SEC  120K  1.1 MM
$ AN EARLIER EVENT, ONE YEAR AND FOUR MINUTES EARLIER, APPEARS TO BE DISTINCT
$
FBC   6502221557P   58502                         59422          40 120  22        8 1
FBC    NW 0533KM 10  000 301 49                  10  000          0000288 35ML31MN
SCH   6502221557P                                 60540          40  94  13        8 1
SCH    SW 0870KM          214 49                 10  000          0000217 41ML33MN
GDH   6502221557P                                                                  8 1
GDH    N  0901KM          015 49                                  0000000 00ML00MN
             Z

+61.542- 59.747F ML=4.8 0821023 10081965 00.0250.139 0.4  5  8  40.55 218.00   0 1MN=3.9  10  0 3.65
$+61.75 - 61.50  MB=4.2 CEEF
$ LABRADOR RIDGE
$ LOW FBC MAGNITUDE
$ FBC PN FITS LESS WELL, NEEDS TO BE REREAD ON ORIGINAL RECORDS.
$
FBC   6508100822P   22133                        A23002          30 130 135        8 1
FBC    NW 0510KM 04  304 302 49                  16  003          0002175 42ML39MN
SCH   6508100822P  A22523                        A24140          30 100  85        8 1
SCH    SW 0856KM 16 -018 212 49                  16  014          0001780 48ML42MN
BLC   6508100822P   24505                         27430          50  83  25        8 1
BLC    NW 1845KM 04 -193 295 50                  04 -118          0000379 53ML41MN
RES   6508100822P   25125                        X28205          90 105  20        8 1
RES    NW 2016KM 04  088 331 47                  00 -023          0000133 50ML37MN
CMC   6508100822P  X26179                         30325                  26        8 1
CMC    NW 2637KM 00  580 309 36                  04 -032          0000000 00ML00MN
MBC   6508100822P  X26230                                                          8 1
MBC    NW 2719KM 00  387 330 36                                   0000000 00ML00MN
             Z
```

```
+61.174- 60.462F ML=4.3 2112075 30121965 00.0220.151 0.5  4  7  40.49 218.00   0 1MN=0.0  00  0 3.65
$+60.92 - 60.67  ML=4.2 CEEF
$ LABRADOR RIDGE
$ LOW FBC MAGNITUDE
$
FBC  6512302113P  A13146                      A14037          30 130  32 0     8 1
FBC   NW 0502KM 13  010 308 49                13 -002          0000516 36ML33MN
SCH  6512302113P  A13511                      A15075          50  85  46 0     8 1
SCH   SW 0801KM 13  016 211 49                13  019          0000680 45ML38MN
GWC  6512302113P   14373                      X16280          40  94  19 0     8 1
GWC   SW 1205KM 03 -285 245 49                00 -518          0000318 46ML37MN
SIC  6512302113P   14487                       16486          40 136  13 5     8 1
SIC    S  1287KM 03 -152 201 49               03 -214          0000150 44ML34MN
              Z

+59.612- 55.918F ML=4.6 2131179 31121965 00.0180.101 0.4  3  6  30.36 218.00   0 1MN=0.0  00  0 3.65
$+59.66 - 56.83  ML=4.5 CEEF
$ LABRADOR RIDGE
$
FBC  6512312133P  A33018                      A34190                    7 5    8 1
FBC   NW 0807KM 12 -021 310 49                12  009          0000000 00ML00MN
SCH  6512312133P  A33072                      A34271          40  80 110 0     8 1
SCH   SW 0845KM 12  042 236 49                12 -010          0002160 50ML43MN
SIC  6512312133P   33550                       35540          40 136  15 0     8 1
SIC   SW 1257KM 03 -199 218 49                03 -082          0000173 44ML35MN
GWC  6512312133P  X34100                      X36175          40 104   8       8 1
GWC   W  1390KM 00 -317 259 49                00 -557          0000121 44ML34MN
              Z

+60.665- 59.018F ML=4.2 0256317 11011966 00.0230.164 0.4  3  5  40.41 218.00   0 1MN=0.0  00  0 3.65
$+60.78 - 58.00  ML=4.3 CEEF
$ LABRADOR RIDGE
$
FBC  6601110256P  A57507                      A58484          40 120  28 0     8 1
FBC   NW 0599KM 11  024 309 49                11 -007          0000367 39ML33MN
SCH  6601110256P  A58147                      A59312          40  99  63 5     8 1
SCH   SW 0799KM 11 -014 219 49                11  018          0001000 46ML39MN
GWC  6601110256P   59075                      X61044          40 110  14 0     8 1
GWC   W  1255KM 03 -297 250 49                00 -368          0000200 45ML35MN
SIC  6601110256P  X59080                      X61048          30 160   5 5     8 1
SIC   SW 1266KM 00 -379 206 49                00 -558          0000065 39ML31MN
              Z

+60.334- 58.160O ML=4.8 2329049 28041966 00.0210.132 0.4 10 16  50.98 218.00   0 1MN=0.0  00  0 3.65
$+60.67 - 57.83  ML=4.8 CEEF
$ LABRADOR RIDGE
$
FBC  6604282329P  A30320           X31300     A31340  X32050  50 110  41       8 1
FBC   NW 0659KM 18  100 310 49     00 3875$   18 -045 00 -053  0000468 42ML35MN
SCH  6604282329P  A30480                      A32057          40  94 282       8 1
SCH   SW 0802KM 18 -047 224 49                18  074         0004712 53ML46MN
```

```
SIC  6604282329P   31405                        33400                        8 1
SIC    SW 1255KM 05 -319 209 49                 05 -130          0000000 00ML00MN
GWC  6604282329P   31447                         33467          40 110  31      8 1
GWC    W  1288KM 05 -300 253 49                 05 -160          0000443 49ML39MN
SFA  6604282329P   32335                         35125          50  58  10      8 1
SFA    SW 1687KM 05 -282 215 49                 05 -063          0000217 49ML38MN
BLC  6604282329P   33099                                                        8 1
BLC    NW 1983KM 05 -066 299 47                                  0000000 00ML00MN
RES  6604282329P   33300                         36555          50 167   8      8 1
RES    NW 2176KM 05 -107 332 43                 05 -175          0000060 46ML34MN
FFC  6604282329P  X34210                                                          1
FFC    W  2649KM 00  532 276 36                                  0000000 00ML00MN
CMC  6604282329P   34285                                                          1
CMC    NW 2790KM 05  081 311 35                                  0000000 00ML00MN
MBC  6604282329P   34364                                                          1
MBC    NW 2879KM 05  134 331 34                                  0000000 00ML00MN
YKC  6604282329P   34400                                                          1
YKC    NW 2926KM 05  106 299 34                                  0000000 00ML00MN
              Z

+60.101- 56.397F ML=4.0 0058047 30111966 00.0350.206 0.5  3  6  30.72 218.00   0 1MN=0.0   00  0 3.65
$+60.17 - 56.17  ML=4.0 CEEF
$ LABRADOR RIDGE
$ RELATED EARTHQUAKE AT 1145; SIMILAR SIZE
$
FBC  6611300059P  A59428                        A60538          40 133   6 0     8 1
FBC    NW 0752KM 12  064 308 49                 12 -024          0000071 34ML27MN
SCH  6611300059P  A59544                        A61170          40  94  22 0     8 1
SCH    SW 0856KM 12 -059 231 49                 12  056          0000368 43ML35MN
GWC  6611300059P   60552                         63042          50  86   6 0     8 1
GWC    W  1376KM 03 -304 256 49                 03 -259          0000088 43ML33MN
              Z

+60.176- 56.495F ML=4.1 1145167 30111966 00.0250.146 0.5  3  6  30.51 218.00   0 1MN=0.0   00  0 3.65
$+60.20 - 55.93  ML=4.1 CEEF
$ LABRADOR RIDGE
$ FBC LOW MAGNITUDE
$ RELATED EARTHQUAKE AT 0058; SIMILAR SIZE
$
FBC  6611301146P  A46532                        A48038          40 133   9 0     8 1
FBC    NW 0742KM 12  019 307 49                 12 -022          0000106 35ML29MN
SCH  6611301146P  A47070                        A48285          40  94  25 0     8 1
SCH    SW 0858KM 12 -011 230 49                 12 -014          0000418 43ML36MN
GWC  6611301146P   48112                         50217          50  86   7       8 1
GWC    W  1372KM 03  136 256 49                 03  362          0000102 44ML33MN
              Z

+61.803- 60.869F ML=4.5 1845140 27081967 00.0380.209 0.3  5 10  40.98 218.00   0 1MN=0.0   00  0 3.65
$+62.17 - 60.33  ML=4.5 CEEF
$ LABRADOR RIDGE
$ LOW FRB MAGNITUDE
$
```

```
FBC  6708271846P  A46146         X46394   A46577          40 133 121        8 1
FBC   NW 0444KM 15  073 302 49   00 1371$ 15 -010          0001429 40ML37MN
SCH  6708271846P  A47031                  A48256          40  94  70        8 1
SCH   SW 0852KM 15 -057 207 49            15  088          0001170 48ML40MN
GWC  6708271846P   47459                   49385          60  63  15        8 1
GWC   SW 1217KM 04 -228 241 49            04 -386          0000249 47ML36MN
SIC  6708271846P   48006                   50077          50 110  11        8 1
SIC   S  1346KM 04 -330 198 49            04 -208          0000126 44ML34MN
BLC  6708271846P   48551                   51400                  18        8 1
BLC   NW 1778KM 04 -140 294 52            04 -174          0000000 00ML00MN
              Z

+60.821- 59.232F ML=4.3 0314170 15111967 00.0240.165 0.6  4  7  30.60 218.00   0 1MN=0.0  00  0 3.65
$+61.10 - 58.00  ML=4.3 CEEF
$ LABRADOR RIDGE
$ FBC MAGNITUDE LOW.
$
FBC  6711150315P  A15334                  A16296          40 133  23 0      8 1
FBC   NW 0579KM 13  008 308 49            13  007          0000272 36ML31MN
SCH  6711150315P  A16010                  A17180          50  85  80 0      8 1
SCH   SW 0805KM 13  006 217 49            13  029          0001183 48ML40MN
GWC  6711150315P   16532                   18496          40 104  16 0      8 1
GWC   W  1250KM 03 -198 249 49            03 -276          0000242 46ML36MN
SFA  6711150315P   17467                                          16 2      8 1
SFA   SW 1700KM 03 -332 211 49                             0000000 00ML00MN
RES  6711150315P  X18283                                          20 4      8 1
RES   NW 2100KM 00 -699 331 45                             0000000 00ML00MN
              Z

+59.892- 55.832O ML=3.6 1701294 17031968 00.0460.253 0.5  3  5  30.74 218.00   0 1MN=0.0  00  0 3.65
$+59.88 - 56.40  ML=3.5 CEEF
$ LABRADOR RIDGE
$ FBC, SCH - NO LG
$ NOT AT SIC
$ LOW FBC MAGNITUDE
$
FBC  6803171703P  A0312                   A0427           30 126   3 0      8 1
FBC   NW 0791KM 11  036 308 49            11 -007          0000050 32ML26MN
SCH  6803171703P  A03205                  A04440          30  98  14 0      8 1
SCH   SW 0867KM 11 -051 234 49            11  055          0000299 41ML35MN
GWC  6803171703P                           0632           20 119   1 5      8 1
GWC   W  1401KM          258 49           03 -494          0000026 34ML27MN
              Z

+60.951- 58.851O MN=3.4 0002486 16041968 00.1970.480 0.2  4  8  52.64 218.00   0 1ML=3.8  10  0 3.65
$+61.82 - 61.40  MN=3.3 CEEF
$ LABRADOR RIDGE
$ FBC MAGNITUDE LOW
$ FBC ORIGINALLY READ AS PN WITH LARGE SN RESIDUALS
$   FBC AS PG FITS SN ARRIVALS BEST.
$ LG PHASES FIT ACCEPTABLY WELL
$ MAGNITUDES SHOULD BE ML? ML=4.4
$
```

```
FBC  6804160004P                04230          X05240   30 145  45        1
FBC   NW 0587KM        306-87   10 -034        10 -550   0000650 38ML35MN
GWC  6804160004P                               X08590   70  51   5        1
GWC   W  1275KM        249 49                  00 2099$  0000088 43ML32MN
BLC  6804160004P                       09455   X11350   50  80   5        1
BLC   NW 1917KM        297 50        10 -039   10  105   0000079 46ML34MN
FCC  6804160004P                       09560   X11510   90  44   5        1
FCC   W  1968KM        279 47        10 -073   10  310   0000079 47ML35MN
RES  6804160004P                       10235   X12270   50 151   4        1
RES   NW 2098KM        331 45        10 -077   10  364   0000033 43ML31MN
FFC  6804160004P                               X14510                     1
FFC   W  2605KM        274 37                  00  867   0000000 00ML00MN
            Z

+56.406- 46.669F ML=4.6 0834361 23071969 00.0350.091 0.1 10 16  41.04 218.00   0 1MN=0.0   00   0 3.65
$56.51  46.49  MB=4.1  CEEF
$+56.0 47.0  MB=4.1  0834377  ISC
$ EASTERN LABRADOR SEA, ON LABRADOR RIDGE
$ SOUTH OF GREENLAND.
$ WAHLSTROM'S READINGS USED BELOW
$ NOT RECORDED AT GDH OR KTG (S. GREGERSEN, COPENHAGEN)
$ OTT, SUD: NOT RECORDED
$ GWC - POOR PHASE
$ FBC - VERY POOR PHASE
$
STJ  6907230834P  A36530                 A38323          40  30   7       8 1
STJ   SW 1068KM 18  095 205 49           18 -032          0000367 46ML37MN
SCH  6907230834P  A37166                 A39179          30 105  17       8 1
SCH   W  1277KM 18 -098 270 49           18  073          0000339 46ML38MN
FBC  6907230834P   37380                 B39568                           8 1
FBC   NW 1453KM 05 -108 313 49           05  211          0000000 00ML00MN
SIC  6907230834P   37428                  40031          50 110  13       8 1
SIC   W  1501KM 05 -217 251 49           05 -186          0000149 46ML35MN
HAL  6907230834P   38172                  40596
HAL   SW 1768KM 05 -026 229 49           05 -204          0000000 00ML00MN
GWC  6907230834P   38330                 B41375                           8 1
GWC   W  1937KM 05 -358 279 50           05 -002          0000000 00ML00MN
SFA  6907230834P   38370                 X41461          70  39   2       8 1
SFA   W  1948KM 05 -087 248 47           00  613          0000046 45ML32MN
NOR  6907230834P   40132
NOR   N  2974KM 05 -084 009 33                            0000000 00ML00MN
LAO  6907230834P   41478                                                    1
LAO   W  4133KM 05  218 281 31                            0000000 00ML00MN
UBO  6907230834P   42378                                                    1
UBO   W  4800KM 05  238 276 30                            0000000 00ML00MN
            Z

+60.653- 58.907F ML=5.4 2114122 24111969 00.0190.083 0.3 17 21 111.02 218.00   0 1MN=0.0   00   0 3.65
$+60.54 - 59.13  MB=4.9 CEEF
$ LABRADOR RIDGE
$ USCGS 21 14 13.7  60.6N  58.8W  D=33KM MB=5.0
$ ISC   21 14 13.2  60.47N 58.88W D=33KM MB=4.9
```

```
$ SFA - SN ONSET UNCERTAIN
$ LHC - APPEARS TO BE LG ON HORIZONTALS.
$ ALE - NO SN
$ YKC - POOR SN - HINT OF LG- NEITHER ONSETS MEASURED.
$ FOCAL MECHANISM BY SYKES AND SBAR 1974
$ POLARITIES ADDED FROM ISC.
$ MORE ISC POLARITIES FOR DISTANT STATIONS
$ SHOULD TRY A MECHANISM.
$
FBC  6911242115P  A1532  C                A1630                            1
FBC   NW 0605KM 20  036 309 49            20 -016       0000000 00ML00MN
SCH  6911242115P  A1555  D                A1713                            1
SCH   SW 0801KM 20 -069 219 49            20  087       0000000 00ML00MN
GDH  6911242115P   16186 C                 1754                            1
GDH   N  0992KM 05 -031 012 49            05  135       0000000 00ML00MN
GWC  6911242115P   1649  C                 1846        30 109 125        8 1
GWC   W  1260KM 05 -262 250 49            05 -371       0002402 54ML46MN
SIC  6911242115P  X16477 D
SIC   SW 1267KM 00 -478 206 49                          0000000 00ML00MN
STJ  6911242115P   17195                                                 8 1
STJ   S  1511KM 05 -268 162 49                          0000000 00ML00MN
SFA  6911242115P  X1739                   X2016        30  71  37        8 1
SFA   SW 1693KM 00 -545 212 49            00 -587       0001091 54ML45MN
HAL  6911242115P  X17545 D                X2043        70  35  10        8 1
HAL   S  1811KM 00 -388 192 52            00 -382       0000256 52ML39MN
BLC  6911242115P  X1808                   X2108        90  34  21        8 1
BLC   NW 1930KM 00 -389 298 50            00 -415       0000431 54ML42MN
FCC  6911242115P   18135 C                X2116        80  54  31        8 1
FCC   W  1970KM 05 -290 279 47            00 -474       0000451 55ML42MN
KTG  6911242115P   18175 C                                               8 1
KTG   NE 1980KM 05 -003 041 47                          0000000 00ML00MN
OTT  6911242115P   18198                  X2124        80  35  55        8 1
OTT   SW 2028KM 05 -285 221 47            00 -893       0001234 59ML47MN
RES  6911242115P   18315                  X2149        80  94  37        8 1
RES   NW 2125KM 05 -157 332 45            00 -470       0000309 54ML41MN
SUD  6911242115P  X1830                   X2149        80  38  37        8 1
SUD   SW 2133KM 00 -395 232 45            00 -649       0000765 58ML45MN
WES  6911242115P   1842
WES   SW 2201KM 05  106 208 43                          0000000 00ML00MN
LHC  6911242115P   1858                               100  24  20        8 1
LHC   W  2360KM 05  137 248 41                          0000524 56ML44MN
ALE  6911242115P   1906                                                  8 1
ALE   N  2444KM 05  135 359 39                          0000000 00ML00MN
FFC  6911242115P   19195 C                X2330       100  40  13        8 1
FFC   W  2604KM 05  044 275 37            00 -569       0000204 53ML41MN
NOR  6911242115P   19250                                                 8 1
NOR   N  2655KM 05  153 014 36                          0000000 00ML00MN
MBC  6911242115P  X19408 C                X2420        90  84   7        8 1
MBC   NW 2828KM 00  270 331 35            00 -319       0000058 48ML36MN
YKC  6911242115P   19425 C                                               8 1
YKC   NW 2873KM 05  064 298 34                          0000000 00ML00MN
EDM  6911242115P   2019
EDM   W  3316KM 05  130 280 33                          0000000 00ML00MN
SES  6911242115P   20251 C
```

```
SES   W  3385KM 05  191 274 33                                         0000000 00ML00MN
FSJ  6911242115P  X2100
FSJ   W  3811KM 00  319 290 32                                         0000000 00ML00MN
              Z

+60.501- 59.429F ML=4.1 1438068 30111969 00.0260.100 0.3  5  9  40.49 218.00   0 1MN=0.0  00  0 3.65
$+60.55 - 59.22  ML=4.2 CEEF
$ ISC 143912  60.1N  73.1W
$ LABRADOR RIDGE
$ AFTERSHOCK OF EVENT OF 24 NOV 21H
$ SCH DATA NOT IN FILE. WAS IT RUNNING?
$ SFA - SN ONSET UNCERTAIN
$ BLC - POOR SN.
$ LAO AND UBO FROM ISC.
$ ISC - POOR LOCATIONS FOR LASA ARRAY ONLY.
$ LARGE DIFFERENCE TO MAINSHOCK PROBABLY BECAUSE SCH NOT READ.
$
FBC  6911301439P  A3925                A40225          40 108  38       8 1
FBC   NW 0594KM 19  009 311 49         19  006          0000553 39ML34MN
GWC  6911301439P   4042                 42375          30 109  13       8 1
GWC   W  1228KM 05 -023 250 49         05  015          0000250 44ML36MN
SFA  6911301439P   4134                 4412                            8 1
SFA   SW 1664KM 05 -144 212 49         05  182          0000000 00ML00MN
BLC  6911301439P  X4201                 4503           40  99   2       8 1
BLC   NW 1913KM 00 -358 299 50         05 -012          0000032 41ML31MN
FCC  6911301439P   42065                4509           60  82   1       8 1
FCC   W  1945KM 05 -166 280 50         05 -093          0000013 39ML27MN
FFC  6911301439P  X43135                                                8 1
FFC   W  2577KM 00  223 275 37                          0000000 00ML00MN
LAO  6911301439P  X44192                                                  1
LAO   W  3368KM 00  276 264 33                          0000000 00ML00MN
UBO  6911301439P  X4514                                                   1
UBO   W  4072KM 00  225 260 31                          0000000 00ML00MN
              Z

+60.913- 60.017F1ML=4.2 0032345 03071970 00.0270.186 0.4  5 10  50.88 218.00   0 1MN=0.0  00  0L3.65
$+60.89 - 60.47  ML=4.2 CEEF
$ LABRADOR RIDGE
$ FBC - ANOTHER PHASE AT 34 49 BUT NOT LG.
$ BLC - PN ONSET A WEE BIT UNCERTAIN.
$
FBC  7007030033P  A33462               A3439           30 126  32       8   1
FBC   NW 0539KM 01  018 309 49         04  038          0000532 37ML34MN
SCH  7007030033P  A34162               A35324          30 105  26       8   1
SCH   SW 0789KM 03 -030 214 49         11  062          0000519 42ML36MN
GWC  7007030033P   35068                36583          30 109  25       8   1
GWC   SW 1215KM 05 -159 247 49         30 -403          0000480 47ML39MN
SIC  7007030033P   3515                 37122          40 132   9       8   1
SIC   S  1269KM 00  000 202 49         05 -166          0000107 42ML33MN
BLC  7007030033P   36236                39166          50  80   2       8          1
BLC   NW 1863KM 18 -311 297 50         24 -364          0000031 42ML30MN
              Z
```

```
+62.160- 62.174F MN=3.9 1736038 12011971 00.0300.162 0.2 10 15 131.05 218.00    0 1ML=0.0   00   0 3.57
$+62.31 - 62.33  MN=3.9 CEEF
$ ISC 173557  62.1+/-.17N  61.9+/-.40W  - NO MB CALCULATED.
$ LABRADOR RIDGE
$ FBC - SN ONSET UNCERTAIN.
$ SCH - POOR LG - ONSET UNCERTAIN.
$ GWC - GOOD SN - POOR LG
$ SFA - POOR ONSETS - LG UNCERTAIN.
$ FFC - LG ONSET UNCERTAIN.
$ MBC - POOR LG ONSET.
$ SES - LG ABOUT 5108
$ LG PRESENT AND AMPLITUDES FOR MN PROBABLY READ FROM IT.
$ HOWEVER MN=3.9 IS TOO SMALL FOR RECORDING STATIONS, SUGGESTING LG IS ATTENUATED.
$ ML=5.1 WAS COMPUTED FROM APPLYING ML FORMULA TO LARGER OF SN OR ATTUNUATED LG.
$    THIS ML PROBABLY TOO LARGE.
$ SG VELOCITY AT 3.57 KM/S
$
FBC  7101121736P  A36548 CNW      X37036      3728  X3745    40 108 450        3 1
FBC   NW 0365KM 20  081 302 49    00  090    05 -325 00 -109   0006545 44ML42MN
SCH  7101121736P  A37538                     A39175  X4008    50  78  51
SCH   S  0861KM 20 -082 200 49               20  047 00  283   0000822 47ML39MN
GWC  7101121736P   3831                       4026  X4128     70  53  40
GWC   SW 1179KM 05 -234 237 49               05  141 00 -622   0000677 51ML40MN
SIC  7101121736P   38575                            X4236     70  63  17
SIC   S  1365KM 05  145 194 49                      00  969   0000242 48ML37MN
BLC  7101121736P   3934                       4212  X4353     60  64  40
BLC   NW 1700KM 05 -279 293 49               05 -328 00 -693   0000654 55ML43MN
SFA  7101121736P   3944                                      110  19   6
SFA   S  1763KM 05 -052 202 49                                 0000180 50ML37MN
FCC  7101121736P  X39425                      4233  X4421     80  54  18
FCC   W  1779KM 00 -386 272 52               05  075 00 -127   0000262 52ML39MN
RES  7101121736P  X3955                             X4446     70 121  26
RES   NW 1893KM 00 -441 331 50                      00 -822   0000193 51ML38MN
FFC  7101121736P   4055                       4449           100  40  18
FFC   W  2425KM 05  056 268 39               05 -069           0000283 54ML42MN
MBC  7101121736P   4110                                       90  84   5
MBC   NW 2595KM 05  019 329 37                                 0000042 46ML34MN
YKC  7101121736P   4115                             X4814     80  65  12
YKC   NW 2642KM 05  107 294 36                      00 -976   0000145 52ML39MN
EDM  7101121736P                                    X5035     70  81   9
EDM   W  3120KM          275 33                     00 -275   0000100 51ML39MN
SES  7101121736P                                              90 105  15
SES   W  3206KM          269 33                                0000100 51ML39MN
INK  7101121736P                                             120  51   7
INK   NW 3213KM          313 33                                0000072 49ML38MN
BMO  7101121736P  X43035
BMO   W  3976KM 00  220 267 32                                 0000000 00ML00MN
             Z

+60.636- 59.3150 ML=3.3 1145032 22021971 00.0830.618 0.5  2  4  21.07 218.00    0 1MN=0.0   00   0 3.65
$ 60.63  59.46  ML=3.3   CEEF
$ LABRADOR RIDGE
```

```
$ MAGNITUDE UNCERTAIN
$
FBC  7102221145P  A4622                               A4717               20 126    5          8 1
FBC   NW 0589KM 10  131 310 49                        10 -074              0000125 30ML28MN
SCH  7102221145P  A46435                              A48006              30 105    9          8 1
SCH   SW 0786KM 10 -130 218 49                        10  075              0000180 37ML32MN
GDH  7102221145P                                                                               8 1
GDH   N  0999KM          013 49                                            0000000 00ML00MN
            Z

+61.764- 60.9600 ML=4.6 0131479 16041971 00.0320.180 0.3  7 11  80.90 218.00   0 1MN=0.0  00  0 3.57
$+61.75 - 60.68  ML=4.3 CEEF
$ LABRADOR RIDGE
$ FBC - FM ARE DSE - ONLY HINT OF LG.
$ BLC - LG MAY BE EARLIER.
$ RES - POOR S ONSETS.
$ SG VELOCITY AT 3.57 KM/S.
$
FBC  7104160132P  A32480 DSE                          A3332               40 108 115           8 1
FBC   NW 0442KM 16  041 303 49                        16  010              0001673 41ML37MN
SCH  7104160132P  A33365                              A34585              30 105  24           8 1
SCH   SW 0846KM 16 -036 206 49                        16  063              0000479 43ML36MN
GWC  7104160132P   34194                               3612               50  75  10           8 1
GWC   SW 1211KM 04 -194 241 49                        04 -346              0000168 45ML34MN
SFA  7104160132P   3523                                                                          1
SFA   SW 1748KM 04 -386 206 49                                             0000000 00ML00MN
BLC  7104160132P   3527                                3814   X4006     70  71  13             8 1
BLC   NW 1776KM 04 -322 295 49                        04 -164 00  057    0000164 50ML37MN
FCC  7104160132P  X3533                                       X4028     70  65   6             8 1
FCC   W  1846KM 00 -511 274 50                                00  304    0000083 47ML34MN
RES  7104160132P  X35455                              X3852   X4058     80  94  10             8 1
RES   NW 1963KM 00 -586 331 47                        00 -351 00  007    0000084 47ML35MN
FFC  7104160132P   3645                                       X4321    100  40   6             8 1
FFC   W  2488KM 04  060 270 39                                00 -399    0000094 49ML37MN
YKC  7104160132P   3706                                       X4431     90  54   5             8 1
YKC   NW 2718KM 04  136 296 36                                00  166    0000065 48ML36MN
            Z

+60.635- 57.1970 ML=3.8 0132098 13071971 00.0240.077 0.5  2  4  20.13 218.00   0 1MN=0.0  00  0 3.65
$ 60.63  57.45  ML=3.8 CEEF
$ FBC - FROM AN E-W DIRECTION.
$ LABRADOR RIDGE
$
FBC  7107130132P  A33385                              A3444               30 126   8           8 1
FBC   NW 0681KM 14 -003 305 49                        14  002              0000133 34ML29MN
SCH  7107130132P   34015                               35225              50  78  13           8 1
SCH   SW 0863KM 03  066 226 49                        03 -037              0000209 41ML33MN
GDH  7107130132P                                                                               8 1
GDH   N  0977KM          009 49                                            0000000 00ML00MN
            Z
```

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+62.121- 60.870F MN=3.3 1434057 25061972 00.0310.162 0.1  3  5  40.39 218.00   0 1ML=3.7  10  0 3.65
$+62.14 - 61.06  MN=3.3 CEEF
$ LABRADOR RIDGE
$
FBC  7206251435P  A35037          X35141     A35456  X36016   40109.  57          1
FBC   NW 0426KM 11  032 298 49    00 -038    11 -008 00 -092   0000821 37ML34MN
SCH  7206251435P  A35591                     A37233            50  89  13         1
SCH   SW 0884KM 11 -016 206 49               11  011           0000184 41ML33MN
GWC  7206251435P                                     X39534   50  82   6          1
GWC   SW 1235KM         240 49                       00  930   0000092 42ML32MN
BLC  7206251435P   37438                             X42145   50 110   8          1
BLC   NW 1764KM 03 -274 293 49                       00  546   0000091 46ML35MN
RES  7206251435P                                     X43083                       1
RES   NW 1931KM         330 50                       00 1351$  0000000 00ML00MN
             Z

+61.715- 61.256O MN=3.2 2338132 13081972 00.0220.134 0.2  2  4  50.22 218.00   0 1ML=3.7  10  0 3.65
$+61.68 - 62.20  MN=3.2 CEEF
$ LABRADOR RIDGE
$ SN ONSETS UNCERTAIN AT BLC AND FFC
$
FBC  7208132339P  A39114          X39236     A39547  X40102   40 109  52          1
FBC   NW 0432KM 10 -026 305 49    00  057    10  015 00 -157   0000749 37ML34MN
SCH  7208132339P  A40010                     A4120   X4208    50  88   8          1
SCH   SW 0834KM 10  027 205 49               10 -014 00  614   0000114 38ML30MN
GWC  7208132339P                                     X4339    50  78   5          1
GWC   SW 1195KM         241 49                       00 -160   0000081 41ML31MN
BLC  7208132339P                             X44305  X4618    60  87   7          1
BLC   NW 1764KM         295 49               00 -736 00  146   0000084 46ML34MN
FCC  7208132339P                             X44448  X4640    60  81   4          1
FCC   W  1830KM         274 52               00 -721 00  525   0000052 45ML32MN
             Z

+60.072- 57.779O ML=4.3 0149351 27081973 00.0010.006 0.7  2  4  20.01 218.00   0 1MN=0.0  00  0 3.65
$ 60.07  57.91  ML=4.4  CEEF
$ LABRADOR RIDGE
$ SCH - NO LG, MAX FROM SN.
$ FRB - NO LG, MAX FROM SN.
$ STJ AND  SIC NO TRACE
$ PBQ NO RECORD
$
FRB  7308270149P   5106                       5213             30 126  20       8 1
FRB   NW 0698KM 10  001 311 49               10  000            0000332 38ML33MN
SCH  7308270149P   51180                      5234             30 105 100       8 1
SCH   SW 0796KM 10  000 227 49               10  001            0001995 48ML42MN
STJ  7308270149P                                                                8 1
STJ   S  1431KM         164 49                                  0000000 00ML00MN
             Z

+61.361- 59.673F ML=4.9 0354284 12101973 00.0240.138 0.3 15 18 111.13 218.00   0 1MN=0.0  00  0 3.65
$+61.34 - 59.99  ML=4.4 CEEF
```

```
$ 61.15+/-4KM   59.32+/-2KM  MB=4.3   03 54 28.(0)  NEIS
$ 61.33+/-0.083N  59.5+/-0.12W  MB=4.2/6  0354281 ISC
$ LABRADOR RIDGE
$
FRB  7310120355P  A5539          X5545     A5630        40 108 160       8 1
FRB   NW 0528KM 19  036 304 49   00 -877   19 -024       0002327 44ML40MN
SCH  7310120355P  A56160                   A5738        50  78 290       8 1
SCH   SW 0841KM 19 -078 213 49             19  120       0004672 54ML46MN
PBQ  7310120355P   5704                    X5901        50  77 105       8 1
PBQ   SW 1252KM 05 -289 245 49             00 -323       0001714 55ML45MN
POC  7310120355P                            6035        50 103  10       8 1
POC   SW 1695KM          208 49            05 -337       0000122 47ML35MN
SFA  7310120355P   5803                    X6043        50  50  13       8 1
SFA   SW 1740KM 05 -340 209 49             00 -504       0000327 52ML40MN
UNB  7310120355P   5810                                                  8 1
UNB   S  1775KM 05 -069 198 49                           0000000 00ML00MN
CHQ  7310120355P                            6055        70  69   8       8 1
CHQ   SW 1777KM          210 49            05 -087       0000104 48ML35MN
BLC  7310120355P  X58165                   X6110        40 140  15       8 1
BLC   NW 1857KM 00 -346 296 50             00 -292       0000168 48ML38MN
HAL  7310120355P  X5819                                                  8 1
HAL   S  1881KM 00 -369 190 50                           0000000 00ML00MN
FCC  7310120355P  X58235                   X6120        40 118  15       8 1
FCC   W  1918KM 00 -335 277 50             00 -593       0000200 49ML39MN
KTG  7310120355P  X58163                                                 8 1
KTG   NE 1950KM 00 ****$043 47                           0000000 00ML00MN
MNT  7310120355P   5832                    X6135        50 157  17       8 1
MNT   SW 1986KM 05 -247 214 47             00 -541       0000136 49ML37MN
RES  7310120355P  X5838                     6150        50 195  10       8 1
RES   NW 2036KM 00 -184 331 47             05 -100       0000064 46ML34MN
OTT  7310120355P   5842                     6155        40  80  13       8 1
OTT   SW 2063KM 05 -071 218 45             05 -166       0000255 51ML40MN
DAG  7310120355P   59088                                                 8 1
DAG   NE 2284KM 05  334 026 41                           0000000 00ML00MN
MBC  7310120355P   5948                                                  8 1
MBC   NW 2739KM 05  109 330 35                           0000000 00ML00MN
YKC  7310120355P   5953
YKC   NW 2799KM 05  096 297 35                           0000000 00ML00MN
EDM  7310120355P   6031
EDM   W  3262KM 05  134 279 33                           0000000 00ML00MN
SES  7310120355P   6038
SES   W  3339KM 05  219 272 33                           0000000 00ML00MN
NTI  7310120355P  X6113                                                  8 1
NTI   W  3788KM 00  168 275 32                           0000000 00ML00MN
NEW  7310120355P  X6114                                                  8 1
NEW   W  3825KM 00 -018 274 32                           0000000 00ML00MN
COL  7310120355P  X6138                                                  8 1
COL   NW 4107KM 00  208 315 31                           0000000 00ML00MN
IMA  7310120355P  X6148                                                  8 1
IMA   NW 4243KM 00  160 319 31                           0000000 00ML00MN
CDF  7310120355P  X61575                                                 8 1
CDF   W  4257KM 00 1010$276 31                           0000000 00ML00MN
EUR  7310120355P  X62075                                                 8 1
EUR   W  4489KM 00  248 264 30                           0000000 00ML00MN
```

```
LBF  7310120355P  X61459                                                     8 1
LBF    W  4645KM 00 ****$271 30                               0000000 00ML00MN
              Z

+58.001- 52.388F MB=4.4 0924278 13121975 00.0360.101 0.0 11 14  01.09 210.00   0 1ML=0.0  00  0 3.65
$+57.94 - 52.25  ML=4.5 CEEF
$ LABRADOR RIDGE
$ MAGNITUDE DATA NOT AVAILABLE.
$ ISC MB ADOPTED AS MAGNITUDE.
$ ISC 13092422 MB=4.4 AT SIX STATIONS
$ COPIES OF DAG FROM GREGERSEN; SN IS 15 SEC TOO EARLY.
$
SCH  7512130924P  A2631                    A2802                               1
SCH    W  0956KM 17  005 254 49            17  009         0000000 00ML00MN
FRB  7512130924P  A2648                    A2828                               1
FRB    NW 1083KM 17  155 313 49            17 -097         0000000 00ML00MN
STJ  7512130924P                            2842                               1
STJ    S  1162KM         181 49            04 -376         0000000 00ML00MN
PBQ  7512130924P    2745                    3013                               1
PBQ    W  1577KM 04 -167 270 49            04 -103         0000000 00ML00MN
KTG  7512130924P    2833                                                       1
KTG    NE 1988KM 04 -189 034 47                            0000000 00ML00MN
BLC  7512130924P    2917  C                                                    1
BLC    NW 2401KM 04 -019 305 39                            0000000 00ML00MN
FCC  7512130924P    2919                                                       1
FCC    W  2405KM 04  148 290 39                            0000000 00ML00MN
DAG  7512130924P    29210                 XB3310                               1
DAG    N  2472KM 04 -278 020 39            00 ****$        0000000 00ML00MN
RES  7512130924P    2931                                                       1
RES    NW 2561KM 04 -086 333 37                            0000000 00ML00MN
FFC  7512130924P    3011                                                       1
FFC    W  3020KM 04  035 285 33                            0000000 00ML00MN
EDM  7512130924P  X31095                                                       1
EDM    W  3750KM 00  072 289 32                            0000000 00ML00MN
INK  7512130924P    3121                                                       1
INK    NW 3924KM 04 -121 321 32                            0000000 00ML00MN
NEW  7512130924P  X3151                                                        1
NEW    W  4291KM 00  053 284 31                            0000000 00ML00MN
COL  7512130924P  X3218                                                        1
COL    NW 4660KM 00  013 321 30                            0000000 00ML00MN
IMA  7512130924P  X32281                                                       1
IMA    NW 4791KM 00  048 324 30                            0000000 00ML00MN
EUR  7512130924P  X32367                                                       1
EUR    W  4892KM 00  167 274 29                            0000000 00ML00MN
PMR  7512130924P  X32393                                                       1
PMR    NW 4946KM 00  069 317 29                            0000000 00ML00MN
              Z

+58.275- 54.166F ML=4.8 1719440 24091977 00.0160.060 0.4  8 13  70.54 218.00   0 1MN=0.0  00  0 3.65
$+58.25 - 54.24  ML=4.8 CEEF
$ LABRADOR RIDGE
$ NO CBK RECORD THIS DAY
```

```
$
SCH  7709241721P  A2136                          A22575          30 103 320      8 1
SCH   W  0866KM 17  069 249 49                   17 -006          0006507 54ML48MN
FRB  7709241721P  A2150                          A2323           30 132  25      8 1
FRB   NW 0986KM 17  005 314 49                   17 -011          0000397 44ML37MN
STJ  7709241721P   2214                           2407           40  33   5      8 1
STJ   S  1196KM 04 -157 175 49                   04 -082          0000238 45ML36MN
MNQ  7709241721P   2224                           2424           40 204 100      8 1
MNQ   SW 1278KM 04 -162 234 49                   04 -135          0000770 51ML41MN
PBQ  7709241721P   2248                           2506           30  90  15      8 1
PBQ   W  1473KM 04 -132 267 49                   04 -070          0000349 48ML39MN
LGQ  7709241721P   2257                          X2519           30 201  18      8 1
LGQ   W  1549KM 04 -160 261 49                   00 -390          0000188 46ML37MN
AGM  7709241721P   23040                                                           1
AGM   SW 1595KM 04 -019 225 49                                    0000000 00ML00MN
POC  7709241721P                                  2537           50 101  13      8 1
POC   SW 1612KM          228 49                  04  067          0000162 48ML36MN
EMM  7709241721P  X23222                                                           1
EMM   SW 1762KM 00 -235 217 49                                    0000000 00ML00MN
             Z

+60.741- 58.735F ML=4.2 2034067 20081978 00.0210.139 0.4  5 10  30.69 218.00   0 1MN=0.0   00  0 3.65
$+60.70 - 59.02  ML=4.1 CEEF
$ LABRADOR RIDGE
$
FRB  7808202035P  A3527                          A3626           30 132  30      8 1
FRB   NW 0610KM 15  012 308 49                   15  009          0000476 39ML34MN
SCH  7808202035P  A3552                          A3710           20 107  70      8 1
SCH   SW 0815KM 15  008 219 49                   15  041          0002055 47ML42MN
PBQ  7808202035P   3647                           3843                           8 1
PBQ   W  1273KM 04 -069 250 49                   04 -389          0000000 00ML00MN
SIC  7808202035P   3646                           3846                           8 1
SIC   SW 1280KM 04 -263 207 49                   04 -254          0000000 00ML00MN
IGL  7808202035P   37075                          3921           20 311  07      8 1
IGL   NW 1438KM 04 -031 322 49                   04 -101          0000071 39ML32MN
             Z

+60.089- 56.173F ML=4.2 1021314 06091978 00.0190.107 0.3  4  7  20.44 218.00   0 1MN=0.0   00  0 3.65
$+60.07 - 56.29  ML=4.2 CEEF
$ LABRADOR RIDGE
$ SIMILAR EVENT ML=4.2 ON 780914
$
FRB  7809061023P  A23105                         A2424           50 094 015      8 1
FRB   NW 0767KM 13 -011 307 49                   13  014          0000201 40ML32MN
SCH  7809061023P  A23230                         A2445           30 105 030      8 1
SCH   SW 0865KM 13  028 232 49                   13  003          0000598 44ML38MN
MNQ  7809061023P   2418                                                            1
MNQ   SW 1328KM 03 -113 222 49                                    0000000 00ML00MN
PBQ  7809061023P   24235                          26346                            1
PBQ   W  1387KM 03 -281 257 49                   03 -133          0000000 00ML00MN
             Z
```

```
+60.137- 56.086F ML=4.2 0754413 14091978 00.0180.100 0.4  3  6  30.35 218.00    0 1MN=0.0   00   0 3.65
$+60.13 - 56.45  ML=4.2 CEEF
$ LABRADOR RIDGE
$ SIMILAR EVENT ML=4.2 ON 780906
$
FRB  7809140754P  A56205                         A57340              30 132  15         8 1
FRB   NW 0767KM 12 -007 307 49                   12  013              0000238 38ML33MN
SCH  7809140754P  A56335                         A57565              20 107  30         8 1
SCH   SW 0873KM 12  003 232 49                   12  014              0000881 44ML39MN
PBQ  7809140754P   57360                          59445              50 079   8         8 1
PBQ   W  1393KM 03 -092 257 49                   03 -257              0000127 45ML34MN
              Z

+60.850- 59.189F ML=4.2 0013543 09121978 00.0200.119 0.3 13 25 111.15 218.00    0 1MN=0.0   00   0 3.65
$+60.87 - 59.21  ML=4.2 CEEF
$ LABRADOR RIDGE
$
FRB  7812090015P  A1512                          A1608               20 126 027         8 1
FRB   NW 0583KM 22  083 308 49                   22  025              0000673 37ML35MN
SCH  7812090015P  A1539                          A1657               20 107 055         8 1
SCH   SW 0809KM 22  020 217 49                   22  107              0001615 46ML41MN
PBQ  7812090015P   1630                           1829               30 090 012         8 1
PBQ   W  1254KM 05 -297 249 49                   05 -147              0000279 45ML37MN
SIC  7812090015P   1634                           1835               30 251 018         8 1
SIC   SW 1280KM 05 -224 205 49                   05 -116              0000150 43ML34MN
MNQ  7812090015P   1636                           1838               30 314 040         8 1
MNQ   SW 1296KM 05 -213 212 49                   05 -145              0000267 45ML37MN
LAQ  7812090015P   1640                           1843               30 670 080         8 1
LAQ   SW 1323KM 05 -146 242 49                   05 -227              0000250 45ML37MN
LCQ  7812090015P   1641                           1847               30 775 040         8 1
LCQ   SW 1343KM 05 -286 241 49                   05 -246              0000108 42ML33MN
LGQ  7812090015P   1644                           1854               30 201 012         8 1
LGQ   SW 1367KM 05 -283 243 49                   05 -064              0000125 43ML34MN
IGL  7812090015P   1651                           19025              30 210 014         8 1
IGL   NW 1413KM 05 -136 322 49                   05 -180              0000140 43ML35MN
LMQ  7812090015P   1718                           1954               40 126 002         8 1
LMQ   SW 1646KM 05 -283 211 49                   05  004              0000025 39ML28MN
BLC  7812090015P   1750                           2049                                    1
BLC   NW 1906KM 05 -137 298 50                   05 -023              0000000 00ML00MN
FCC  7812090015P   1754                           2057                                    1
FCC   W  1952KM 05 -247 279 47                   05 -192              0000000 00ML00MN
RES  7812090015P   1811                          X2125               40 243 002         8 1
RES   NW 2099KM 05 -147 331 45                   00 -518              0000013 38ML27MN
              Z

+57.022- 45.711F1ML=4.6 1100594 23101979 00.0190.050 0.2 18 21  90.65 218.00    0 1MN=0.0   00   0 3.65
$ ISC: 59.7 N 53.9 W OT=110140 MB=4.6 H=N
$ EASTERN LABRADOR SEA ON LABRADOR RIDGE.
$ SOUTH OF GREENLAND.
$ APPARENTLY NOT IN CEEF.
```

```
$ ISC LOCATION IN CONSIDERABLE ERROR AS NO LOCAL PHASES USED
$ NEW LOCATION BY ADAMS AFTER EVENT FOUND BY SEARCH OF CBK.
$ SEVERAL CAN STNS W OF -80 LON SHOULD BE INCLUDED - CF ISC
$ COMBINATION ADAMS AND WAHLSTROM READINGS.
$ GNT, SUD, EFO: NOT RECORDED, FHO: DISTURBED SIGNAL, UNB: NO CLEAR ONSET
$ MNQ SN AT PAPER EDGE, MUN: UNCLEAR RECORD
$ CHECK FOR GREENLAND RECORDS.
$ SHOULD TRY A FOCAL MECHANISM; ISC HAS 7 COMPRESSION POLARITIES.
$ ML LOW RLATIVE TO MB
MUN  7910231103P XB03265                 XB05140      50  51  18        8 1
MUN   SW 1155KM 00  050 207 49            00 -053      0000444 48ML38MN
STJ  7910231103P  A03263                  A05142      50  36   8        8 1
STJ   SW 1155KM 20  030 207 49            20 -034      0000279 46ML36MN
CBK  7910231103P   03355                   05275      30  92  15        8 1
CBK   SW 1219KM 05  172 227 49            05 -061      0000341 46ML38MN
SCH  7910231103P  A03475                  A05533      30 108  22        8 1
SCH   W  1336KM 20 -060 268 49            20  020      0000427 48ML39MN
FRB  7910231103P   04030                  X06147      50 100   6        8 1
FRB   NW 1456KM 05  037 310 49            00 -376      0000075 43ML32MN
SIC  7910231103P   04194                              80  85  13        8 1
SIC   W  1580KM 05  161 250 49                         0000120 47ML35MN
MNQ  7910231103P   04290                  X0707       60 123   6        8 1
MNQ   W  1674KM 05 -033 254 49            00  197      0000051 44ML32MN
HAL  7910231103P   04517                                                  1
HAL   SW 1857KM 05  078 230 50                         0000000 00ML00MN
POC  7910231103P   05042                                                  1
POC   SW 1966KM 05  106 247 47                         0000000 00ML00MN
LMQ  7910231103P   05040                                                  1
LMQ   W  1968KM 05  055 248 47                         0000000 00ML00MN
LAQ  7910231103P   05060                  X08098      50 266  11        8 1
LAQ   W  1998KM 05 -074 273 47            00 -410      0000052 45ML33MN
LGQ  7910231103P   05114                  X08210      40 151   5        8 1
LGQ   W  2047KM 05 -054 273 47            00 -324      0000052 44ML33MN
CHQ  7910231103P   05163                                                  1
CHQ   W  2072KM 05  160 248 45                         0000000 00ML00MN
MIQ  7910231103P   05486                                                  1
MIQ   W  2378KM 05  301 253 41                         0000000 00ML00MN
OTT  7910231103P  X05566                                                  1
OTT   W  2436KM 00  553 251 39                         0000000 00ML00MN
RES  7910231103P   06250                                                  1
RES   NW 2843KM 05 -155 332 34                         0000000 00ML00MN
FFC  7910231103P   07150                                                  1
FFC   W  3435KM 05  063 290 33                         0000000 00ML00MN
MBC  7910231103P   07224                                                  1
MBC   NW 3538KM 05 -008 334 32                         0000000 00ML00MN
EDM  7910231103P   08116                                                  1
EDM   NW 4163KM 05  048 294 31                         0000000 00ML00MN
INK  7910231103P   08172                                                  1
INK   NW 4257KM 05 -099 323 31                         0000000 00ML00MN
               Z

+62.334- 61.240F1MN=3.6 2209554 11031980 00.0310.155 0.3  6 10  70.75 218.00   0 1MN=0.0  00  0 3.65
$+62.28 - 61.82  MN=3.4 CEEF
```

```
$ LABRADOR RIDGE
$ NEAR NORTH END OF RIDGE
$ LG ON STATIONS TO NW AND SW.
$ LG MAY BE PARTLY ATTENUATED; ML WOULD BE 4.4
$
FRB  8003112210P  A1051                      A1130   X1141    10  75  95
FRB   NW 0402KM 15  084 296 49               15 -030 00 -471   0007959 40ML43MN
SCH  8003112210P  A1150                      A1316
SCH   SW 0897KM 15 -060 203 49               15  023           0000000 00ML00MN
IGL  8003112210P   1230                       1421   X1538    30 168  14
IGL   NW 1216KM 04  061 319 49               04 -241 00  945   0000175 43ML35MN
PBQ  8003112210P   1234                       1427            60  70   6
PBQ   SW 1231KM 04  275 238 49               04  032           0000090 43ML32MN
BLC  8003112210P   1331                              X1800    40 190  23
BLC   NW 1737KM 04 -193 293 49                       00  867   0000190 48ML38MN
FCC  8003112210P   1342                      X1630   X1819    50  90  05
FCC   W  1827KM 04 -146 272 52               00 -351 00  295   0000070 45ML34MN
RES  8003112210P                             X1653   X1857    60 157  06
RES   NW 1901KM         330 50               00  384 00 2080$  0000040 44ML31MN
FFC  8003112210P                                     X2126   100  38  05
FFC   W  2474KM         269 39                       00 1270$  0000083 49ML37MN
             Z

+60.931- 58.697F1ML=3.3 0414472 23051980 00.0200.071 0.0  3  5  10.19 218.00   0 1MN=3.2  30  0 3.65
$+60.92 - 58.90  ML=3.7 CEEF
$ LABRADOR RIDGE
$
FRB  8005230416P  A1606                      A1704            20 126  07          1
FRB   NW 0599KM 15  000 306 49               15 -001           0000175 33ML30MN
SCH  8005230416P   1635                       1753            30 105  22          1
SCH   SW 0833KM 04  046 219 49               04 -080           0000439 42ML36MN
PBQ  8005230416P  X1733                       1930            40  93  03          1
PBQ   W  1282KM 00  371 249 49               04  065           0000051 39ML30MN
             Z

+61.841- 61.577F1MN=5.0 2029586 06041981 00.0260.162 0.4 11 14 100.91 218.00   0 1MN=0.0  00  0 3.57
$+61.94 - 61.34  MN=4.8 CEEF
$ ISC 202955.3  61.75N  61.30W  MB=4.9  MS=3.6
$ LABRADOR RIDGE
$ SG VELOCITY AT 3.57 KM/S
$ WERE SG OR SN AMPS READ? USE OF MN ASSUMES LG NOT UNDULY ATTENUATED
$ SHOULD A MECHANISM BE TRIED? SEE ISC FOR POLARITY DATA.
$
FRB  8104062030P  A30555                                      02 126  52
FRB   NW 0415KM 19  059 304 49                                 0012965 36ML46MN
SCH  8104062030P  A31465                     A3308            08  46  24
SCH   SW 0840KM 19 -035 204 49               19  068           0004098 46ML46MN
GDH  8104062030P  X3151
GDH   N  0906KM 00 -380 021 49                                 0000000 00ML00MN
PBQ  8104062030P   3229                      X3425   X3538    08  49  29
PBQ   SW 1187KM 05 -016 239 49               00  387 00  670   0004648 51ML49MN
JAQ  8104062030P   32323                      3427   X3548    06 115  49
JAQ   SW 1225KM 05 -142 229 49               05 -209 00  631   0004462 50ML49MN
IGL  8104062030P  X32345                     X3434   X3547    05  99  35
```

```
IGL   NW 1247KM 00 -188 321 49          00  027 00 -087   0004443 49ML49MN
MNQ  8104062030P   3245                  3452              06  64   45
MNQ   SW 1336KM 05 -230 203 49          05 -078            0000654 43ML41MN
STJ  8104062030P   3329
STJ   SE 1686KM 05 -095 157 49                             0000000 00ML00MN
CBM  8104062030P  X33400                X36308
CBM   S  1713KM 00  674 197 49          00 1783$           0000000 00ML00MN
BLC  8104062030P   3334                 X3619   X3805     10  82  55
BLC   NW 1743KM 05 -287 294 49          00 -027 00 -181    0004214 56ML51MN
FCC  8104062030P  X3342                  3631   X3825     10  33  15
FCC   W  1812KM 00 -301 274 52          05 -313 00 -138    0002856 55ML50MN
GNT  8104062030P   3350                                   07 022   38
GNT   SW 1858KM 05 -026 207 50                             0001224 50ML46MN
MIM  8104062030P  X33538
MIM   S  1911KM 00 -247 198 50                             0000000 00ML00MN
PQ0  8104062030P   33553
PQ0   S  1916KM 05 -154 194 50                             0000000 00ML00MN
RES  8104062030P  X3353                 X3700             9  77  22
RES   NW 1940KM 00 -645 331 50          00 -123            0001995 53ML49MN
MNT  8104062030P   34046 D
MNT   SW 1980KM 05  069 209 47                             0000000 00ML00MN
GAC  8104062030P  X3403                 X3720   X3925     10  52  13
GAC   SW 2009KM 00 -407 213 47          00  410 00  364    0001571 53ML48MN
OTT  8104062030P  X34145
OTT   SW 2048KM 00  324 213 47                             0000000 00ML00MN
DAG  8104062030P  X3434  C
DAG   NE 2280KM 00 -125 027 41                             0000000 00ML00MN
ALE  8104062030P  X3437
ALE   N  2310KM 00 -125 360 41                             0000000 00ML00MN
YKA  8104062030P  X35156
YKA   NW 2691KM 00  261 295 36                             0000000 00ML00MN
INK  8104062030P  X36010
INK   NW 3261KM 00  139 314 33                             0000000 00ML00MN
             Z

+61.300- 59.014F1ML=5.2 1120336 24081981 00.0200.110 0.5 19 30 121.16 218.00   0 1MN=0.0  00  0 3.65
$+61.33 - 59.39  MB=4.8 CEEF
$ ISC 1120337  61.15N  59.16W  MB=4.8  MS=4.6
$ LABRADOR RIDGE
$ SP-P IS 8+/-0.6 SEC (ISC)
$ SP TIMES GIVE APPROX DEPTH 18 KM; ISC STATES 23 (PP?)
$ ISC HAS POLARITY DATA.
$ POSSIBLE FOR FOCAL MECHANISM
$
FRB  8108241123P  A2148                 A22432                       8 1
FRB   NW 0562KM 23  020 303 49          23  077            0000000 00ML00MN
PBQ  8108241123P   23141                 2515             30  90 163       8 1
PBQ   SW 1282KM 06 -150 247 49          06 -062            0003793 57ML48MN
JAQ  8108241123P   23165                 25165            30 314  45       8 1
JAQ   SW 1298KM 06 -114 237 49          06 -267            0000300 46ML37MN
MNQ  8108241123P  A23232                A25293            40 110  12       8 1
MNQ   SW 1343KM 23  000 211 49          23  044            0000171 45ML35MN
IGL  8108241123P   2327                  2534             60  78 175       8 1
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IGL    NW 1380KM 06 -057 320 49            06 -250        0002349 58ML47MN
LPQ   8108241123P    24059                  26474        50  46  02          8 1
LPQ    SW 1707KM 06 -159 209 49            06  124        0000055 44ML32MN
GNT   8108241123P    24269                               70  22  02          8 1
GNT    SW 1874KM 06 -018 213 50                           0000082 47ML34MN
BLC   8108241123P    24265                   2722        80 126 105          8 1
BLC    NW 1892KM 06 -251 296 50            06 -342        0000654 56ML44MN
MIM   8108241123P    24287                 X2713
MIM    SW 1905KM 06 -179 205 50            00 ****$       0000000 00ML00MN
FCC   8108241123P    2434                   2735         50  90  42          8 1
FCC    W  1954KM 06 -198 277 47            06 -368        0000586 55ML43MN
MNT   8108241123P    24432                  27500                            8 1
MNT    SW 2000KM 06  202 215 47            06  144        0000000 00ML00MN
GAC   8108241123P    24444                               60 210  08          3 1
GAC    SW 2040KM 06 -100 219 47                           0000040 44ML32MN
RES   8108241123P    2446                   27592        50 195  39          8 1
RES    NW 2059KM 06 -146 331 45            06 -186        0000251 52ML40MN
OTT   8108241123P    2450
OTT    SW 2079KM 06  037 219 45                           0000000 00ML00MN
FHO   8108241123P    24500                  28048        60  29  15          8 1
FHO    SW 2090KM 06 -082 220 45            06 -287        0000542 56ML43MN
WBO   8108241123P    24498                 X28035        80  16  15          8 1
WBO    SW 2104KM 06 -251 218 45            00 -711        0000736 57ML45MN
FFC   8108241123P    2542
FFC    W  2594KM 06  249 273 37                           0000000 00ML00MN
MBC   8108241123P  X2604
MBC    NW 2762KM 00  998 330 35                           0000000 00ML00MN
YKC   8108241123P    2602                  X30405       100  45  20          8 1
YKC    NW 2834KM 06  197 297 35            00 -542        0000279 55ML43MN
EDM   8108241123P    26405
EDM    W  3298KM 06  284 279 33                           0000000 00ML00MN
              Z

+61.347- 59.451F1ML=3.8 0746036 01091981 00.0420.234 0.3  5  8  40.92 218.00   0 1MN=0.0   00   0 3.65
$+61.29 - 59.79  ML=3.8 CEEF
$ LABRADOR RIDGE
$
FRB   8109010747P                          A4808                                 8 1
FRB    NW 0539KM          304 49           16  026        0000000 00ML00MN
SCH   8109010747P  A47526                  A49137        30 105  17          8 1
SCH    SW 0846KM 16 -001 214 49            16  059        0000339 41ML35MN
PBQ   8109010747P   4841                    5039         50  79   4          8 1
PBQ    SW 1262KM 04 -233 246 49            04 -259        0000064 41ML31MN
JAQ   8109010747P   48425                   5042         20 503   5          8 1
JAQ    SW 1281KM 04 -318 236 49            04 -369        0000031 34ML28MN
MNQ   8109010747P   4851                   X50594        30 157   3          8 1
MNQ    SW 1336KM 04 -138 210 49            00  202        0000040 37ML29MN
              Z

+62.027- 61.598F1ML=3.7 1328517 27061982 00.0450.245 0.2  4  7  40.83 218.00   0 1MN=0.0   00   0 3.57
$+62.00 - 61.89  ML=3.7 CEEF
$ LABRADOR RIDGE
```

```
$ SG VELOCITY AT 3.57 KM/S.
$ NO ECTN PLAYOUTS.
$ NEED TO CHECK JAQ PN ON ANALOG!
$
FRB  8206271329P  A2947                      A3027   X3048   40 118  45        8 1
FRB   NW 0402KM 13  050 302 49               13 -018 00  344  0000599 35ML32MN
SCH  8206271329P  A30418                     A3205           60  64   8        8 1
SCH   SW 0859KM 13 -040 203 49               13  063          0000131 40ML31MN
JAQ  8206271329P    31235                    B33240          30 314   7        8 1
JAQ   SW 1237KM 03 -485 229 49               03 -089          0000047 37ML29MN
MNQ  8206271329P                  X3241      B3347           40 198   3        8 1
MNQ   S  1354KM          202-88   00 1079$   03 -285          0000024 36ML27MN
            Z

+60.901- 59.523F1ML=5.0 1819093 12021983 00.0140.072 0.2 27 39  61.09 218.00   0 1MN=0.0  00  0 3.65
$+60.91 - 59.58  MB=4.4 CEEF
$ ISC  60.81N  59.3W  MB=4.4 1819052
$ LABRADOR RIDGE
$ WHY NO SCH READING?
$ NO CBK READING
$ RSON HAS A SECOND PHASE 3.8 SEC. AFTER P.
$
FRB  8302121820P  A20249                     A2119           30 132 241        8 1
FRB   NW 0565KM 25  088 308 49               25  002          0003824 46ML43MN
GDH  8302121820P   21120 C                    2247
GDH   N  0973KM 06 -174 014 49               06  126          0000000 00ML00MN
PBQ  8302121820P   21463 D                    23424
PBQ   W  1239KM 06  009 248 49               06  003          0000000 00ML00MN
MNQ  8302121820P  A21520                     A23538          50 216  95        8 1
MNQ   SW 1291KM 25 -060 211 49               25  028          0000553 50ML40MN
IGL  8302121820P   22042 D                    24130
IGL   NW 1397KM 06 -127 322 49               06 -298          0000000 00ML00MN
GSQ  8302121820P   220745                     24215          60 348 120        8 1
GSQ   SW 1420KM 06 -081 203 49               06  065          0000361 50ML39MN
HTQ  8302121820P   22073                      24229          60 176  55        8 1
HTQ   SW 1420KM 06 -099 207 49               06  200          0000327 50ML38MN
EBN  8302121820P   222945                     24595          55 263  73        8 1
EBN   SW 1599KM 06 -065 204 49               06  054          0000317 51ML39MN
KLN  8302121820P   223245                     2508                             8 1
KLN   S  1628KM 06 -119 199 49               06  287          0000000 00ML00MN
LPQ  8302121820P   223445                    X25143          70 355  95        8 1
LPQ   SW 1655KM 06 -246 209 49               00  347          0000240 50ML38MN
BLC  8302121820P   23021                      25573
BLC   NW 1887KM 06 -225 297 50               06 -296          0000000 00ML00MN
KAO  8302121820P   23060                      26060
KAO   SW 1925KM 06 -249 239 50               06 -223          0000000 00ML00MN
FCC  8302121820P   23080
FCC   W  1933KM 06 -139 278 50                                0000000 00ML00MN
MNT  8302121820P   2312
MNT   SW 1948KM 06  087 215 47                                0000000 00ML00MN
OTT  8302121820P   2320
OTT   SW 2027KM 06  019 219 47                                0000000 00ML00MN
CKO  8302121820P   231845                     2631                             8 1
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CKO   SW 2030KM 06 -164 223 47              06  036        0000000 00ML00MN
RSNY 8302121820P   23256
RSNY  SW 2074KM 06  071 215 45                             0000000 00ML00MN
RES  8302121820P   23230                    X26375
RES   NW 2085KM 06 -301 331 45              00 -479        0000000 00ML00MN
PTN  8302121820P   23273
PTN   SW 2086KM 06  115 216 45                             0000000 00ML00MN
DAG  8302121820P   23502 C
DAG   NE 2326KM 06 -041 025 41                             0000000 00ML00MN
RSON 8302121820P   23563
RSON  W  2379KM 06  066 257 41                             0000000 00ML00MN
ALE  8302121820P   23580
ALE   N  2416KM 06 -112 359 39                             0000000 00ML00MN
FFC  8302121820P  X24160
FFC   W  2569KM 00  289 274 37                             0000000 00ML00MN
MBC  8302121820P   2434
MBC   NW 2787KM 06  209 331 35                             0000000 00ML00MN
YKC  8302121820P   2437
YKC   NW 2830KM 06  151 298 35                             0000000 00ML00MN
RSNT 8302121820P   24380
RSNT  NW 2836KM 06  204 298 34                             0000000 00ML00MN
YKA  8302121820P   24381
YKA   NW 2836KM 06  213 298 34                             0000000 00ML00MN
INK  8302121820P   2524
INK   NW 3412KM 06  151 316 33                             0000000 00ML00MN
             Z

+60.834- 59.096F1ML=3.6 0720309 05041983 00.0190.123 0.2  5  8  30.46 218.00   0 1MN=0.0   00  0 3.65
$ 60.91 (0.08) 58.88 (0.20) ML=3.6 (0.2) CEEF
$ LABRADOR RIDGE
$
FRB  8304050720P                            A22455                        8 1
FRB   NW 0588KM        308 49               16  004       0000000 00ML00MN
SCH  8304050720P  A22158                    A2333        020 107 012      8 1
SCH   SW 0811KM 16  018 218 49              16  010       0000352 39ML35MN
KAQ  8304050720P   225530                    24442       0154216 062      8 1
KAQ   SW 1152KM 04 -191 235 49              04 -128       0000062 35ML30MN
MNQ  8304050720P   231292                    25166       0153200 042      8 1
MNQ   SW 1297KM 04 -196 212 49              04  028       0000055 35ML30MN
HTQ  8304050720P  C232695                                                 8 1
HTQ   SW 1424KM 01 -345 209 49                            0000000 00ML00MN
             Z

+59.139- 54.381F1ML=4.6 2229315 26051983 00.0130.057 0.3 12 23 110.62 218.00   0 1MN=0.0   00  0 3.65
$+59.15 -54.41  ML=4.5 CEEF
$ LABRADOR RIDGE
$
SCH  8305262232P  A31268                    A32511        30 105  98      8 1
SCH   SW 0894KM 20  054 243 49              20  003       0001955 49ML43MN
FRB  8305262232P  A31288                    A32547        50  94  20      8 1
FRB   NW 0912KM 20  035 310 49              20 -019       0000267 43ML34MN
CBK  8305262232P   32000                     33500        50 188  25      8 1
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CBK    S  1162KM 05  099 193 49          05  179        0000167 44ML34MN
SIC   8305262232P  A321200               C341360       30 220  34        8
SIC    SW 1275KM 20 -073 224 49          01  145        0000324 46ML38MN
KAQ   8305262232P   32157                 34180        30 369 150        8 1
KAQ    W  1305KM 05 -070 252 49          05 -056        0000851 50ML42MN
MNQ   8305262232P   32192                 34251        40 600  85        8 1
MNQ    SW 1328KM 05  000 230 49          05  167        0000223 46ML36MN
GSQ   8305262232P   32286                 34404        301080 145        8 1
GSQ    SW 1408KM 05 -031 222 49          05  001        0000281 46ML38MN
PBQ   8305262232P  C3236                 C3451         60  92  24        8
PBQ    W  1469KM 01 -034 263 49          01 -234        0000273 49ML38MN
KLN   8305262232P   32501                 35165        251660  50        8 1
KLN    SW 1584KM 05 -032 215 49          05 -140        0000076 41ML33MN
EBN   8305262232P   32508                 35209        251265  60        8 1
EBN    SW 1589KM 05 -028 221 49          05  183        0000119 43ML35MN
LMQ   8305262232P  C3258                 C3536         02 292   8        8
LMQ    SW 1664KM 01 -217 226 49          01  108        0000861 41ML44MN
VDQ   8305262232P   33323                                                8 1
VDQ    SW 1960KM 05 -230 242 47                         0000000 00ML00MN
               Z


+59.883- 55.673F1ML=4.3 0732041 02021984 00.0210.120 0.2  5 10  50.66 218.00   0 1MN=0.0  00  0 3.65
$ 59.93  55.93  ML=4.3  CEEF
$ LABRADOR RIDGE
$
FRB  8402020732P  A33474                 A35045        50 101  45        8 1
FRB   NW 0803KM 15 -037 308 49           15  020        0000560 45ML37MN
SCH  8402020732P  A33573                 A35195        30 137  62        8 1
SCH   SW 0874KM 15  077 235 49           15 -005        0000948 46ML40MN
KAQ  8402020732P   34429                  3641         30 295  27        8 1
KAQ   SW 1265KM 04 -135 247 49           04 -182        0000192 44ML35MN
SIC  8402020732P   3445                   36485        50 132 007        8 1
SIC   SW 1290KM 04 -219 218 49           04  053        0000067 41ML31MN
MNQ  8402020732P   3450                   3655         20 443  23        8 1
MNQ   SW 1330KM 04 -217 224 49           04 -165        0000163 42ML35MN
              Z

+60.130- 57.560F1ML=3.1 0645351 06041984 00.0690.208 0.3  3  5  30.53 218.00   0 1MN=0.0  00  0 3.65
$ APPARENTLY NOT IN CEEF
$ LABRADOR RIDGE EVENT, MUST BE CONSIDERED POORLY LOCATED
$ ADAMS FILE
$ NEW EVENT DETECTED BY RE-SEARCH OF SCH RECORDS
$ ON SCH LEMS AS D.U.V.
$ VERY WEAK ON FRB, WEAK ON JAQ
$ NOT ON MNQ,SIC,VDQ,CBK,MUN
$
FRB  8404060647P XB47135                 B48145        040 124   2       8 1
FRB   NW 0703KM 00  687 310 49           04  038        0000025 29ML22MN
SCH  8404060647P  A47195                 A48370        040 120   5       8 1
SCH   SW 0810KM 15 -015 227 49           15  016        0000065 35ML27MN
JAQ  8404060647P   4822                   5020         030 419   2       8 1
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JAQ   SW 1305KM 04  190 245 49                 04 -228          0000010 31ML23MN
             Z

+61.564- 60.625F1ML=4.0 2227358 03121984 00.0520.325 0.4  5 10  51.49 218.00   0 1MN=0.0  00  0 3.65
$ 61.54  60.39  ML=4.2  CEEF
$ LABRADOR RIDGE
$ FRB, SCH READINGS NEED TO BE REMEASURED.
$
FRB  8412032227P  A2841                        A2925           50 101 017        8 1
FRB   NW 0474KM 15  170 304 49                 15 -092          0000212 33ML29MN
SCH  8412032227P  A2922                        A3044           40 120 027        8 1
SCH   SW 0834KM 15 -133 208 49                 15  124          0000353 42ML35MN
JBQ  8412032227P    3011                        32105          20 209 015        8 1
JBQ   SW 1256KM 04 -373 232 49                 04 -193          0000225 42ML36MN
IGL  8412032227P    3018                        32245          40 157 012        8 1
IGL   NW 1302KM 04 -235 321 49                 04  224          0000120 43ML34MN
MNQ  8412032227P    3020                        32265          20 503 012        8 1
MNQ   SW 1328KM 04 -356 206 49                 04 -134          0000075 38ML32MN
VDQ  8412032227P  X31205                                                         8 1
VDQ   SW 1845KM 00 -544 224 50                                  0000000 00ML00MN
             Z

+60.702- 59.970F1ML=4.2 0127045 05121985 00.0200.151 0.2  5  8  20.56 218.00   0 1MN=0.0  00  0 3.65
$ 60.660 60.140  ML=4.2  CEEF
$ LABRADOR RIDGE
$
FRB  8512050127P  A2818                        A29135                            8 1
FRB   NW 0561KM 14 -062 311 49                 14  034          0000000 00ML00MN
SCH  8512050127P  A28450                       A29577          065 137 030       8 1
SCH   SW 0771KM 14  069 215 49                 14 -025          0000212 40ML32MN
JAQ  8512050127P   293777                                                        8 1
JAQ   SW 1219KM 03 -113 238 49                                  0000000 00ML00MN
MNQ  8512050127P   294255                       31413          022 324 030       8 1
MNQ   SW 1260KM 03 -138 210 49                 03 -068          0000264 44ML37MN
IGL  8512050127P    3002                       X3215                             8 1
IGL   NW 1400KM 03  101 323 49                 00  326          0000000 00ML00MN
             Z

+57.676- 53.252F1ML=4.4 1936280 12041986 00.0280.098 0.2  5  9  30.69 218.00   0 1MN=0.0  00  0 3.65
$ LABRADOR RIDGE
$ NOTHING ON STJ, SMALL ON ECTN, MNQ DOWN
$
SCH  8604121936P  A3823  D   0.00              A39485          030 137  51     0  8
SCH   W  0896KM 14 -010 255 49                 14  033          0000780 45ML39MN
CBK  8604121936P   3837      0.00               4017           050  88  15     0  8
CBK   S  1024KM 04 -171 200 49                 04  160          0000214 44ML34MN
FRB  8604121936P  A3845      0.00              A4025           000   0   0     0  0
FRB   NW 1071KM 14  059 316 49                 14 -033          0000000 00ML00MN
MUN  8604121936P   3849                                                        0  0
MUN   S  1126KM 04 -207 178 49                                  0000000 00ML00MN
JAQ  8604121936P   3931      0.00               4147           0201257  60     0  8
```

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JAQ    W  1470KM 04 -200 263 49                04 -311          0000150 42ML35MN
                Z

+60.798- 57.402F1ML=4.2 1741095 12091986 00.0250.152 0.2  5  9  30.73 218.00   0 1MN=0.0   00   0 3.65
$ LABRADOR RIDGE                           MER DU LABRADOR
$ EAST OF CAPE CHIDLEY, LABRADOR,          EST DU CAP CHIDLEY, LABRADOR,
$ NO NEIS SOLUTION
$
FRB   8609121741P  A4237       0.00          A4340             050 101  35     0  8
FRB    NW 0665KM 14  066 304 49              14 -036             0000435 41ML34MN
SCH   8609121741P  A4301  C    0.00          A4424             030 137  40     0  8
SCH    SW 0868KM 14 -012 224 49              14  038             0000612 44ML38MN
MNQ   8609121741P   43574 D    0.00           4606             030 324  12     0  8
MNQ    SW 1346KM 04 -198 217 49              04  073             0000078 40ML32MN
JAQ   8609121741P   4357       0.00           4604             000   0   0     0  0
JAQ    SW 1346KM 04 -236 243 49              04 -123             0000000 00ML00MN
KLN   8609121741P   4434       0.00                            000   0   0     0  0
KLN    SW 1660KM 04 -367 205 49                                  0000000 00ML00MN
               Z

+61.157- 58.695F1ML=4.5 2228588 07031987 00.0230.141 0.4 10 15  40.92 218.00   0 1MN=0.0   00   0 3.65
$61.146- 58.942F1ML=4.5 2229002 CEEF
$ LABRADOR RIDGE    EAST OF RESOLUTION ISLAND, N.W.T.
$ NO DANISH READINGS...NO PDE...NO EDR
$
FRB   8703072229P  A30165      0.00          A31125            020 132  70     0  8
FRB    NW 0585KM 18  066 304 49              18 -005             0001666 41ML39MN
SCH   8703072229P  A3049       0.00          A3210             020 141 186     0  8
SCH    SW 0853KM 18  045 218 49              18  036             0004144 50ML46MN
JAQ   8703072229P   3141       0.00           33435            0201257 195     0  8
JAQ    SW 1304KM 04 -260 239 49              04 -219             0000487 46ML40MN
MNQ   8703072229P   31465      0.00           3351             000   0   0     0  0
MNQ    SW 1339KM 04 -135 212 49              04 -211             0000000 00ML00MN
IGL   8703072229P   31545      0.00           34045            000   0   0     0  0
IGL    NW 1403KM 04 -112 320 49              04 -216             0000000 00ML00MN
HTQ   8703072229P   32005      0.00          X3416             000   0   0     0  0
HTQ    SW 1466KM 04 -286 209 49              00 -417             0000000 00ML00MN
KLN   8703072229P   32255      0.00                            000   0   0     0  0
KLN    S  1670KM 04 -270 201 49                                  0000000 00ML00MN
LPQ   8703072229P  X32285      0.00                            000   0   0     0  0
LPQ    SW 1702KM 00 -356 210 49                                  0000000 00ML00MN
BLC   8703072229P   3254       0.00         XB3553             000   0   0     0  0
BLC    NW 1914KM 04 -274 297 50              00 -242             0000000 00ML00MN
FCC   8703072229P   33025      0.00          X3603             020 534  10     0  8
FCC    W  1973KM 04 -084 278 47              00 -496             0000059 41ML33MN
EEO   8703072229P   33135      0.00                            000   0   0     0  0
EEO    SW 2083KM 04 -176 228 45                                  0000000 00ML00MN
               Z

+62.160- 60.488F1ML=4.7 1841221 15051987 00.0370.188 0.2  7 11  40.98 218.00   0 1MN=0.0   00   0 3.65
$ LABRADOR RIDGE                           MER DU LABRADOR
$ EAST OF CAPE CHIDLEY, LABRADOR,          EST DU CAP CHIDLEY, LABRADOR,
$ NO DANISH, PDE DATA
```

```
$
FRB   8705151841P  A42220      0.00          A4307          040 123 380    0  8
FRB    NW 0446KM 16 -021 297 49              16  066         0004853 45ML42MN
SCH   8705151841P  A43175      0.00          A44425         030 137  72    0  8
SCH    SW 0897KM 16  027 207 49              16  019         0001101 47ML40MN
IGL   8705151841P   4401       0.00           4557          000   0   0    0  0
IGL    NW 1256KM 04 -002 319 49              04 -173         0000000 00ML00MN
JBQ   8705151841P   4404       0.00           46045         000   0   0    0  0
JBQ    SW 1304KM 04 -283 230 49              04 -435         0000000 00ML00MN
BLC   8705151841P              0.00           4747          030 440  45    0  8
BLC    NW 1781KM         293 52              04 -331         0000214 48ML38MN
FCC   8705151841P   4511       0.00          X48025         050 226  30    0  8
FCC    W  1867KM 04 -379 273 50              00 -626         0000167 49ML38MN
FFC   8705151841P   46225      0.00                         000   0   0    0  0
FFC    W  2513KM 04  165 270 37                              0000000 00ML00MN
              Z
```

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************************************************
*                                              *
*       SOUTHEAST BAFFIN SHELF EARTHQUAKES     *
*                                              *
************************************************
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```
+63.694- 61.175F MN=3.9 1315060 01051966 00.0230.130 0.2  4  7  60.56 218.00   0 1ML=0.0  00  0 3.57
$63.33   60.83   ML=4.8 131506  CEEF
$ NORTHERNMOST LABRADOR SEA
$ SG VELOCITY AT 3.57 KM/S
$
SCH   6605011314P   17185                 18580  X19490   50  85  30 0        1
SCH    S  1040KM 10 -011 200 49          10  080 00 -833   0000444 47ML38MN
GWC   6605011314P   17518                X19531  X21111   50  85  31 0        1
GWC    SW 1320KM 10 -098 232 49          00 -373 00 -484   0000458 50ML39MN
SIC   6605011314P  X18259                                                     1
SIC    S  1544KM 00  583 195 49                            0000000 00ML00MN
BLC   6605011314P   18370                 21152  X22570   50  83  55 0        1
BLC    W  1687KM 10 -055 288 49          10  028 00 -174   0000833 55ML44MN
RES   6605011314P   18483                 21333  X23238   60 143  21 0        1
RES    NW 1773KM 10  035 328 49          10  022 00  115   0000154 49ML37MN
CMC   6605011314P  X20026                X23545  X26310   50 118  15          1
CMC    NW 2434KM 00  506 305 39          00  065 00  303   0000160 51ML39MN
MBC   6605011314P  X20067                                                     1
MBC    NW 2476KM 00  539 328 39                            0000000 00ML00MN
```

```
YKC  6605011314P  X20192                      X24312  X27152   80  83  17 0       1
YKC    W  2622KM 00  473 291 36               00 -264 00 -538   0000161 52ML40MN
              Z

+65.410- 62.694O MN=3.1 0200565 14081971 00.0000.000 0.3  2  3  20.00 218.00   0 1ML=2.9  10  0 3.57
$65.38    62.64   MN=3.3 020057  CEEF
$ NORTHERNMOST LABRADOR SEA
$ FIRST OF 3 EVENTS THIS HOUR.
$ LG VELOCITY AT 3.57 KM/SEC
FBC  7108140200P   0143                          02303    30 126  25
FBC   SW 0334KM 10  000 239 49                  10  000   0000416 29ML29MN
BLC  7108140200P                                 0816     70  71   6
BLC   W  1569KM         281 49                  10  000   0000076 45ML33MN
RES  7108140200P
RES   NW 1573KM         325 49                            0000000 00ML00MN
              Z

+65.417- 62.833O MN=3.3 0202481 14081971 00.0250.059 0.3  3  4  30.19 218.00   0 1ML=3.1  10  0 3.57
$65.39    62.72   MN=3.5 020248  CEEF
$ NORTHERNMOST LABRADOR SEA
$ SECOND AND LARGEST OF 3 EVENTS THIS HOUR.
$ LG VELOCITY AT 3.57 KM/SEC
FBC  7108140202P   0334                          04207    30 126  40
FBC   SW 0329KM 10 -004 238 49                  10  017   0000665 31ML31MN
BLC  7108140202P                                 1006     60  86  13
BLC   W  1562KM         281 49                  10  016   0000158 48ML36MN
FFC  7108140202P                                 1409     80  61   3
FFC   W  2431KM         259 39                  10 -029   0000039 45ML33MN
              Z

+65.410- 62.694O MN=3.0 0204055 14081971 00.0000.000 0.3  2  3  20.00 218.00   0 1ML=2.8  10  0 3.57
$65.38    62.64   MN=3.2 020406  CEEF
$ NORTHERNMOST LABRADOR SEA
$ THIRD OF 3 EVENTS THIS HOUR.
$ LG VELOCITY AT 3.57 KM/SEC
FBC  7108140204P   0452                          05393    30 126  20
FBC   SW 0334KM 10  000 239 49                  10  000   0000332 28ML28MN
BLC  7108140204P                                 1125     60  86   5
BLC   W  1569KM         281 49                  10  000   0000061 44ML32MN
RES  7108140204P
RES   NW 1573KM         325 49                            0000000 00ML00MN
              Z

+64.586- 60.187F ML=4.3 1408138 25031972 00.0760.174 0.3  7 14  91.36 218.00   0 1MN=0.0  00  0 3.65
$64.57    60.95   ML=3.6 140818  CEEF
$ NORTHERNMOST LABRADOR SEA
$
FBC  7203251408P  A09103         09198     A09518  X10040   20 132  75       8 1
FBC   W  0414KM 23  027 260 49   06 -088    23  053 00 -340   0001785 37ML37MN
SCH  7203251408P   1040                     12305           50  81   8       8 1
```

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SCH    S  1150KM 06   020 202 49                 06  262              0000124 43ML33MN
GWC   7203251408P    11092                        13224              40  97   7        8 1
GWC    SW 1420KM 06 -345 231 49                 06 -279               0000113 44ML34MN
BLC   7203251408P    11440                        14230  X16050     50 121   5        8 1
BLC    W  1705KM 06 -345 285 49                 06 -291  00  403      0000052 43ML32MN
RES   7203251408P                                 1431               70 125  10       8 1
RES    NW 1716KM             325 49             06  268               0000072 46ML33MN
FCC   7203251408P    12050                        15030  X16550     50 102   2        8 1
FCC    W  1884KM 06 -346 266 50                 06 -110  00  487      0000025 41ML29MN
LHC   7203251408P                                        X19480     70  44   2        8 1
LHC    SW 2500KM             238 39                      00  927      0000041 46ML34MN
FFC   7203251408P    13170                        17220  X20000     80  61   3        8 1
FFC    W  2542KM 06  182 264 37                 06 -208  00  969      0000039 46ML33MN
YKC   7203251408P   X13270                      X17380  X20220      60 112   2        8 1
YKC    W  2632KM 00  391 290 36                 00 -516  00  708      0000019 43ML31MN
               Z


+64.397- 62.284O1ML=3.2 0106369 06071980 00.2760.496 0.6  2  4  21.00 218.00   0 1MN=0.0   00  0 3.65
$63.94    61.08    ML=3.0 010623  CEEF
$ NORTHERNMOST LABRADOR SEA
$ POORLY LOCATED
$
FRB   8007060106P  A07213                       A0753               40 118  20        8 1
FRB    W  0314KM 14  031 259 49                 14 -018               0000266 28ML27MN
IGL   8007060106P    08415                        1025              40 157   4        8 1
IGL    NW 1015KM 03 -490 312 49                 03  281               0000040 35ML27MN
BLC   8007060106P
BLC    W  1613KM             285 49                                   0000000 00ML00MN
               Z


+63.644- 60.549F1ML=4.2 2221038 06051982 00.0310.075 0.3  5  9  50.48 218.00   0 1MN=0.0   00  0 3.65
$63.36    60.62    ML=4.2 222104  CEEF
$ NORTHERNMOST LABRADOR SEA
$
FRB   8205062221P  A21578                       A22375                                8 1
FRB    W  0396KM 19 -004 275 49                 19  006               0000000 00ML00MN
SCH   8205062221P    2316                         2456              40  94   7        8 1
SCH    SW 1046KM 05 -113 203 49                 05  025               0000117 40ML32MN
IGL   8205062221P    23298                        25126             40 126  24        8 1
IGL    NW 1134KM 05  193 314 49                 05 -191               0000299 45ML36MN
JAQ   8205062221P  X23568                       X26055              20 503  23        8 1
JAQ    SW 1400KM 00 -346 225 49                 00 -551               0000144 42ML35MN
MNQ   8205062221P    24178                      X2646                                 8 1
MNQ    S  1542KM 05  019 202 49                 00  472               0000000 00ML00MN
RES   8205062221P    24484                        2735              70 153   2        8 1
RES    NW 1794KM 05  032 327 52                 05  011               0000012 38ML26MN
ALE   8205062221P                                                   50 157   4        8 1
ALE    N  2109KM             359 45                                   0000032 43ML31MN
               Z


+62.850- 60.822F1MN=3.5 0258333 09031986 00.0280.117 0.3  5  9  50.57 218.00   0 1ML=4.3   10  0 3.65
```

```
$62.840  60.990  MN=3.5 0258320 CEEF
$ NORTHERNMOST LABRADOR SEA
$ WEAK ON FFC,NOTHING ON RES, CBK, MUN
$
FRB  8603090259P  A5928       0.00          A6008    X6022    050 101 235    0  0
FRB   W  0400KM 15  013 288 49              15  014 00 -116    0002924 43ML39MN
SCH  8603090300P  A6036       0.00          A6207    X6322    100  40  20    0  0
SCH   SW 0959KM 15 -002 204 49              15  023 00 2590$   0000314 45ML35MN
IGL  8603090301P   61035      0.00           6254    X6402    050 185  25    0  0
IGL   NW 1187KM 04 -035 317 49              04 -131 00  330    0000170 44ML34MN
JAQ  8603090301P   61185      0.00           6322    X6450    060 302  20    0  0
JAQ   SW 1329KM 04 -259 227 49              04 -340 00 1263$   0000069 42ML31MN
BLC  8603090302P  X62065      0.00          C6450    X6639    070 157  15    0  0
BLC   W  1736KM 00 -418 291 49              01 -192 00 1015$   0000086 47ML34MN
            Z

+64.172- 61.98301ML=2.7 0114355 20081987 00.1000.255 0.6  4  5  20.64 218.00   0 1MN=0.0  00  0 3.65
$64.287  61.811  ML=2.7 0114338  CEEF
$ NORTHERNMOST LABRADOR SEA
$ VERY SMALL ON FRB, SCH, SIC. NOTHING ON CBK, MUN.
$ ON ECTN TRIGGERS: ONLY PN ARRIVALS
$ MNQ ANALOG HAS PN>>SN; SN IS TINY
$
FRB  8708200114P              0.00          A1554             030 141   7    0  8
FRB   W  0325KM          265 49             13 -013             0000104 23ML23MN
SCH  8708200114P  X17063      0.00          A1834             000   0   0    0  0
SCH   S  1078KM 00 1356$197 49              13 -026             0000000 00ML00MN
JAQ  8708200114P  A173154    -0.07           1946             0201257   5    0  8
JAQ   SW 1395KM 13  007 220 49              03  422             0000012 31ML24MN
MNQ  8708200114P   175421    -0.10                            000   0   0    0  0
MNQ   S  1573KM 03  099 198 49                                  0000000 00ML00MN
GSQ  8708200114P  X180335    -0.22                            000   0   0    0  0
GSQ   S  1729KM 00 -899 193 49                                  0000000 00ML00MN
            Z
```

```
**************************************************
*                                                *
*          LABRADOR SHELF EARTHQUAKES            *
*                                                *
**************************************************
```

```
+57.010- 57.730F ML=5.0 0104390 20101952 00.0470.150 0.0 11 16  01.66 218.00   0 1ML=0.0  00  0 3.65
$ 57.0  57.0  ML=5.0  CEEF
$ 56.9  57.2  ISC
```

```
$ LABRADOR SHELF
$ SOURCE OF CEEF MAGNITUDE UNKNOWN.
$ ISC HAS OTHER TELESEISMIC PHASES.
$ ISC SUPPLEMENTARY PHASES POSSIBLY DEPTH PHASES.
$        PP  8.5 SEC  ( 5 OBS )
$        SP  12  SEC  ( 4 OBS )
$ IMPLIED DEPTHS ARE (CRUDELY) 26 KM AND 21 KM RESPECTIVELY.
$ OTTAWA DATA BULLETIN HAS ADDITIONAL P AND S PHASES FOR HAL, SHF, AND OTT.
$
HAL  5210200104P   0740  D                  0956   X1115
HAL    S  1437KM 10 -002 199 49            10  185 00  220    0000000 00ML00MN
SHF  5210200104P   0752     +1.5            1018
SHF   SW 1554KM 10 -074 228 49             10  053             0000000 00ML00MN
OTT  5210200104P   0821  C                  1113   X1252
OTT   SW 1794KM 10 -229 232 52             10  292 00  143    0000000 00ML00MN
KLC  5210200104P   0821  C                  1109   X1255
KLC   SW 1794KM 10 -235 246 52             10 -117 00  436    0000000 00ML00MN
HRV  5210200104P   0835                    X1207
HRV   SW 1890KM 10  067 217 50             00 3653$            0000000 00ML00MN
WES  5210200104P   0832                    X1124
WES   SW 1893KM 10 -264 216 50             00 -719             0000000 00ML00MN
BUF  5210200104P   0906
BUF   SW 2163KM 10  210 233 45                                 0000000 00ML00MN
SCO  5210200104P   0915
SCO   NE 2263KM 10  095 034 43                                 0000000 00ML00MN
RES  5210200104P   0937                     1346
RES   NW 2519KM 10 -130 335 37             10  159             0000000 00ML00MN
COL  5210200104P   1220
COL   NW 4538KM 10  103 319 30                                 0000000 00ML00MN
TUC  5210200104P   1241
TUC   W   4852KM 10 -106 259 29                                0000000 00ML00MN
             Z

+57.103- 59.0790 MN=4.3 0745173 05061956 00.0200.044 0.2  4  5  20.14 218.00   0 1ML=0.0  00  0 3.65
$+56.8  - 58.9    ML=5.1 CEEF
$ LABRADOR SHELF
$ RECORDS MOUNTED IN SCRAPBOOK, BUT PN CUT OFF AT MOST STATIONS.
$ SFA LG VERY POOR.
$ STRONG PHASE AT HAL AT 48166 USED AS PN
$ SMITH READ A HAL PHASE AT 4811 AS PN BUT IS PROBALLY NOISE.
$ LG LOOK ATTENUATED AT HAL. SMALLER THAN SN AMPLITUDE.
$ ALL AMPLITUDES APPEAR TO HAVE BEEN READ FROM LG
$
SFA  5606050745P                                   X5129
SFA   SW 1369KM          221 49                    00 -336   0000000 00ML00MN
HAL  5606050745P  A48166                   A50295  X5148    40 102  11      3
HAL   S  1423KM 15 -001 195 49             15  002 00  072   0000169 46ML36MN
SHF  5606050745P                            50455  X5209   100 1.7   3
SHF   SW 1502KM          224 49            04 -070 00  018   0001109 56ML44MN
MNT  5606050745P                                   X52445
MNT   SW 1636KM          224 49                    00 -107   0000000 00ML00MN
KLC  5606050745P                            5134  XA5317   120  10   8
KLC   SW 1724KM          244 49            04  040 00  720   0000419 53ML41MN
```

```
OTT  5606050745P                                          51365  X5317    50 151  20        3
OTT    SW 1738KM          228 49                        04  009 00  354    0000166 49ML37MN
                Z

+56.691- 59.797O MN=3.4 0706097 12031963 00.2740.507 0.0  2  4  11.41 218.00   0 1ML=3.7  10  0 3.65
$+57.0   - 60.03  ML=3.8 CEEF
$ LABRADOR SHELF
$ ALL STATIONS ARE TO THE SW SO POORLY LOCATED
$
SCH  6303120706P  A0713                                 A08035 XB0827    30 188  65           1
SCH    SW 0486KM 10 -172 247 49                         10  099 00  406   0000724 37ML34MN
SIC  6303120706P  A0802                                 A0921  XB1008                         1
SIC    SW 0860KM 10  172 215 49                         10 -099 00  271   0000000 00ML00MN
SFA  6303120706P                                               XB1210                         1
SFA    SW 1305KM          220 49                                00  266   0000000 00ML00MN
                Z

+59.039- 59.866F ML=3.8 0316461 27121967 00.0440.325 0.5  4  8  21.37 218.00   0 1MN=0.0  00  0 3.65
$ 58.75  59.25  ML=3.8  CEEF
$ NORTHERN LABRADOR SHELF
$
SCH  6712270316P  A18094                                A19101           30 100  37        8 1
SCH    SW 0631KM 14  048 225 49                         14  019           0000775 41ML36MN
FBC  6712270316P  A18160                                A19249           40 133   9        8 1
FBC    NW 0696KM 14 -078 322 49                         14  127           0000106 35ML28MN
FCC  6712270316P   20440                                 23450                             8 1
FCC    W  1954KM 03 -453 284 47                         03 -621           0000000 00ML00MN
BLC  6712270316P   20470                                 23520                             8 1
BLC    NW 1975KM 03 -385 303 47                         03 -362           0000000 00ML00MN
                Z

+57.402- 59.170O MN=2.6 0310336 13011968 00.0010.003 0.5  3  4  40.01 218.00   0 1ML=3.7  10  0 3.65
$ 57.16  58.50 MN=2.6  CEEF
$ LABRADOR SEA EAST OF NAIN.
$ LG POOR ON ALL STATIONS.
$ GWC - ONSETS WEAK.
$ FBC - LG ABOUT 03H 15M
$ SIC - LG UNCERTAIN, SP MICROSEISMS.
$ SCH - MAX AMPS OF LG AND SN EQUAL. SN ONSET SHARP BUT SCH ATTENUATES QUICKLY.
$ NOT AT STJ.
$
SCH  6801130310P  A11470                                A12410  X13080   40  83  20
SCH    SW 0554KM 14  000 242 49                         14  000 00  239   0000379 37ML32MN
FBC  6801130310P                                         13480           40 127   1
FBC    NW 0870KM          328 49                        03  000           0000012 28ML21MN
SIC  6801130310P                                        X13530           40 132   4
SIC    SW 0947KM          215 49                        00 ****$          0000048 35ML27MN
GWC  6801130310P                                         14520  X16040   40  94   1
GWC    W  1170KM          266 49                        03  003 00  968   0000017 33ML24MN
                Z

+56.797- 57.511O ML=4.5 2253568 27091969 00.1880.138 0.3  2  4  20.27 218.00   0 1MN=0.0  00  0 3.65
```

```
$ 56.52  57.49  MN=4.1  CEEF
$ LABRADOR SHELF
$ GWC - WEAK PN - GOOD SN - NO LG.
$ SCH - VERY STRONG PN SN. RELATIVELY WEAK LG.
$ ML CHOSEN IN PREFERENCE TO MN
$
SCH  6909272253P  A55185                    A56185  X5648    40  94 115        8 1
SCH    W  0622KM 14  008 253 49             14 -005 00  072   0001922 46ML40MN
FBC  6909272253P                                                               8 1
FBC    NW 0981KM          327 49                              0000000 00ML00MN
GWC  6909272253P   5636                      5837             30 109   8       8 1
GWC    W  1269KM 03 -133 271 49             03  076           0000154 43ML34MN
               Z

+54.965- 54.669F MN=5.3 1204195 07121971 00.0260.038 0.1 21 26  50.76 218.00   0 1ML=6.0  20  0 3.57
$+55.09 - 54.51  ML=5.3 CEEF
$55.05+/-.022N 54.45+/-.023W  MB=5.4/40  1204187
$ LABRADOR SHELF
$ ADAMS/WAHSTROM WORK
$ RUN WITH SG VELOCITY OF 3.57 KM/S
$ ISC: 55.05 N 54.45 W OT=120418.7 MB=5.4 H=25KM
$ FOCAL MECHANISM PUBLISHED BY HASHIZUME
$ WAHLSTROM COMMENTS
$  FBC: RECORD NOT FOUND
$ SCH, STJ, SIC, UNB, HAL, SFA, GWC, CHQ, QCQ, OTT, SUD REREAD BY WAHLSTROM
$    IN 1985.
$ FBC AND OTHER STATIONS FROM ISC.
$ WAHLSTROM READINGS AND QUALITIES AS FOLLOWS:
$  SCH  A B;  STJ  A A;  SIC  A;  UNB  A B;  HAL  A A B;
$  SFA  A A A;  GWC  A A;  CHQ  A B X;  QCQ  A   A;  OTT  A B;  SUD   A A A;
$
SCH  7112071209P  A06007 D                  A07150                             1
SCH    W  0777KM 24  056 274 49             24  008           0000000 00ML00MN
STJ  7112071209P  A06071                     07279           60  20 204        8 1
STJ    S  0834KM 24  008 170 49             06  099           0010681 58ML50MN
SIC  7112071209P   06233 C                                                     1
SIC    SW 0976KM 06 -099 242 49                               0000000 00ML00MN
FBC  7112071209P   06560                                                       1
FBC    NW 1249KM 06 -164 327 49                               0000000 00ML00MN
UNB  7112071209P   07045 -                   09090                             1
UNB    SW 1312KM 06 -073 225 49             06  050           0000000 00ML00MN
HAL  7112071209P   07054 -                   09100  X10434   90  39 540        1
HAL    SW 1315KM 06 -021 213 49             06  084 00 1552$  0009666 64ML53MN
SFA  7112071209P   07173                    X09366  X11071   70  40 176        8 1
SFA    SW 1426KM 06 -185 239 49             00  382 00  816   0003949 61ML49MN
GWC  7112071209P  X07202 C                  X09362                             1
GWC    W  1468KM 00 -399 281 49             00 -554           0000000 00ML00MN
CHQ  7112071209P   07234 C                  X09480  X11085  100  38 400        1
CHQ    SW 1470KM 06 -110 239 49             00  588 00 -275   0006614 63ML52MN
QCQ  7112071209P   07245 C                          X11216   90  25 500        1
QCQ    SW 1477KM 06 -088 239 49                     00  831   0013963 67ML55MN
GDH  7112071209P  X07472                                                       1
GDH    N  1595KM 00  735 002 49                               0000000 00ML00MN
```

```
MNT  7112071209P   07505                                                          1
MNT   SW 1706KM 06 -280 240 49                                 0000000 00ML00MN
OTT  7112071209P   08069                  X11041              90  26 200          1
OTT   SW 1832KM 06 -128 243 52            00  487              0005370 65ML52MN
SUD  7112071209P   08320 C                 11485  X13573      90  31 272          1
SUD   W  2069KM 06 -250 254 45            06 -113 00 -180      0006126 66ML54MN
FCC  7112071209P   09083                                                          1
FCC   NW 2408KM 06 -021 296 39                                 0000000 00ML00MN
BLC  7112071209P   09160                                                          1
BLC   NW 2500KM 06 -106 311 39                                 0000000 00ML00MN
RES  7112071209P   09430                                                          1
RES   NW 2806KM 06 -061 336 35                                 0000000 00ML00MN
FFC  7112071209P   09585                                                          1
FFC   W  2984KM 06  014 289 33                                 0000000 00ML00MN
ALE  7112071209P  X10041                                                          1
ALE   N  3086KM 00 -244 358 33                                 0000000 00ML00MN
YKC  7112071209P   10342                                                          1
YKC   NW 3434KM 06 -022 309 33                                 0000000 00ML00MN
MBC  7112071209P   10398                                                          1
MBC   NW 3508KM 06 -042 336 32                                 0000000 00ML00MN
LAO  7112071209P   10542                                                          1
LAO   W  3661KM 06  177 277 32                                 0000000 00ML00MN
EDM  7112071209P   10588                                                          1
EDM   W  3735KM 06  055 292 32                                 0000000 00ML00MN
SES  7112071209P   11005                                                          1
SES   W  3745KM 06  143 286 32                                 0000000 00ML00MN
              Z

+55.141- 54.394F ML=4.4 0240012 25011972 00.0500.076 0.3  9 16  81.05 218.00   0 1MN=0.0  00  0 3.65
$ 55.14  54.42  ML=4.5  CEEF
$ LABRADOR SHELF
$ WAHLSTROM REREAD THE RECORDS
$     HE RATED EVERY PHASE FROM HAL ON AN 'A'; ADAMS CHANGED TO 'B' IN OCT 1988
$     QCQ: UNCLEAR ONSETS; POC, SUD: NOT RECORDED
$     PHASES UNB: B46215 AND OTT: B48390 MAY BE LG; NOT USED
$
SCH  7201250240P  A41455                  A43001          30 105  59         8 1
SCH   W  0794KM 15  168 272 49            15  053          0001177 46ML40MN
STJ  7201250240P  A41504                  A43124          40  30   4         8 1
STJ   S  0851KM 15 -030 172 49            15  081          0000209 40ML33MN
SIC  7201250240P  A42075                  A43432          40 135  25         8 1
SIC   SW 1001KM 15 -149 242 49            15 -029          0000291 44ML35MN
FBC  7201250240P                           44332          50 100   5         8 1
FBC   NW 1243KM           326 49          04 -176          0000063 41ML30MN
UNB  7201250240P  A42495                                  70  57  11         8 1
UNB   SW 1339KM 15 -074 225 49                             0000173 47ML35MN
HAL  7201250240P  B42511                  B44571
HAL   SW 1341KM 04  064 213 49            04  125          0000000 00ML00MN
SFA  7201250240P  B43023 C                B45217          40  67   3         8 1
SFA   SW 1451KM 04 -160 239 49            04  241          0000070 42ML32MN
GWC  7201250240P  B43053                  B45238          50  75   9         8 1
GWC   W  1482KM 04 -233 280 49            04 -201          0000151 46ML35MN
```

```
CHQ   7201250240P  B43082                          B45300            60  84   9          8 1
CHQ    SW 1495KM 04 -105 239 49                    04  137            0000112 46ML34MN
                  Z


+55.480- 52.453F ML=4.3 1826309 26051976 00.0320.076 0.2  9 13  40.93 218.00    0 1MN=0.0   00   0 3.65
$+55.47 - 52.74  ML=4.4 CEEF
$ LABRADOR SEA, PROBABLY ON FRACTURE ZONE
$ ADAMS FILE; WAHLSTROM READINGS
$ CBM, EMM, MIM FROM ISC
$ ISC: 55.01 N 53.47 W OT=182633.2 H=0KM
$ QCQ, SUD, OTT: NOT RECORDED, MIQ: NOISY, HAL: VISIBLE, NO CLEAR ONSET
$ CHQ, CBK: RECORD NOT FOUND
$ UNB: DISTURBANCE(?) AT 31042
$
STJ   7605261826P  A28251                          A29475            60  21   5          8 1
STJ    S  0881KM 11  099 181 49                    11 -024            0000249 43ML34MN
MUN   7605261826P                                                    60  35  17          8 1
MUN    S  0881KM          181 49                                      0000509 46ML37MN
SCH   7605261826P  A28293                          A29544            40  91  21          8 1
SCH    W  0916KM 11  085 271 49                    11 -089            0000362 44ML36MN
SIC   7605261826P  A28532                          A30419            40 115   7          8 1
SIC    SW 1128KM 11 -103 244 49                    11  163            0000096 40ML31MN
MNQ   7605261826P  A29052                          A31009            7        2          3 1
MNQ    W  1223KM 11 -073 250 49                    11  021            0000000 00ML00MN
FRB   7605261826P                                  A31149                                  1
FRB    NW 1288KM          322 49                   11  046            0000000 00ML00MN
CBM   7605261826P  C29316
CBM    SW 1446KM 01 -141 235 49                                       0000000 00ML00MN
POC   7605261826P  A29402                                                                  1
POC    SW 1515KM 11 -123 241 49                                       0000000 00ML00MN
PBQ   7605261826P                                 XB32167                                  1
PBQ    W  1596KM          280 49                   00 -320            0000000 00ML00MN
EMM   7605261826P  C29506
EMM    SW 1602KM 01 -146 228 49                                       0000000 00ML00MN
MIM   7605261826P  C29548
MIM    SW 1634KM 01 -111 233 49                                       0000000 00ML00MN
                  Z

+59.255- 60.242O ML=4.2 0849281 05111977 00.1820.392 0.2  4  6  31.06 218.00    0 1MN=0.0   00   0 3.65
$ 59.05   60.61  ML=4.2  CEEF
$ NORTHERN LABRADOR SHELF
$ NO FRB?
$
SCH   7711050849P  A50515                          A5153             30 103  66          8 1
SCH    SW 0634KM 16  024 222 49                    16  050            0001342 44ML39MN
FRB   7711050849P                                                                          1
FRB    NW 0668KM          322 49                                      0000000 00ML00MN
SIC   7711050849P                                   53274            30 140  10          8 1
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SIC   SW 1094KM          205 49              04 -298          0000150 41ML33MN
MNQ  7711050849P   51475                      5331   X54335   20 424  32         8 1
MNQ   SW 1114KM 04 -227 213 49               04 -358 00  011   0000237 41ML35MN
PBQ  7711050849P                               53376                              8 1
PBQ   W  1142KM          255 49              04 -286           0000000 00ML00MN
             Z

+56.916- 59.37501MN=2.7 0754355 31031979 00.0900.177 0.2  3  6  50.94 218.00   0 1ML=3.2  10  0 3.65
$ 56.71  59.95  MN=2.7  CEEF
$ LABRADOR SHELF
$ CBK QUIET
$
SCH  7903310755P   5545                       5636     5657    30 105  10
SCH   SW 0520KM 10  034 246 49               10  050 10 -097    0000199 32ML29MN
MNQ  7903310755P                                       5854    30 314  10
MNQ   SW 0942KM          225 49                        10  018   0000067 36ML29MN
PBQ  7903310755P                                      XB5957    40  93   1
PBQ   W  1155KM          269 49                        00  493   0000017 33ML24MN
LAQ  7903310755P                              5852     5957    40 408   9
LAQ   W  1168KM          260 49              10 -142 10  139   0000035 36ML27MN
LBQ  7903310755P                                      XB6006    40 534   9
LBQ   W  1202KM          259 49                        00  120   0000026 36ML26MN
             Z

+55.939- 58.43601MN=3.2 1732510 04041979 00.0960.084 0.3  4  8  50.57 218.00   0 1ML=3.7  10  0 3.65
$+56.14 - 58.92  MN=3.2 CEEF
$ LABRADOR SHELF
$ CBK TIME CORRECTION ASSUMED; RECORD VERY POOR.
$
SCH  7904041734P  A34034                     A34564  B35194  030 105  26          1
SCH   W  0544KM 16  030 260 49               16  025 04 -070   0000519 37ML34MN
CBK  7904041734P            +5.5             X3543  XC3619
CBK   S  0783KM          177 49              00  161 00 -095   0000000 00ML00MN
MNQ  7904041734P  A34481                      36163  X37047  050 163  28          1
MNQ   SW 0915KM 16 -024 233 49               04  120 00  297   0000216 42ML34MN
LAQ  7904041734P   35237                      37170 XB38240  050 251  34          1
LAQ   W  1213KM 04 -098 267 49               04 -149 00  055   0000170 45ML35MN
PBQ  7904041734P                                     XC38217  060  70  03          1
PBQ   W  1216KM          275 49                      00 -255   0000045 39ML29MN
LBQ  7904041734P  X35240                      37223 XB3835   050 377  12          1
LBQ   W  1245KM 00 -452 265 49               04 -289 00  293   0000040 39ML28MN
             Z

+57.598- 58.77201ML=4.2 0910147 04091979 00.0170.077 0.3 10 18  90.69 218.00   0 1MN=0.0  00  0 3.65
$+57.58 - 58.96  ML=4.2 CEEF
$ LABRADOR SHELF
$
SCH  7909040911P  A11323                     A11890          020 107 144         8 1
SCH   SW 0586KM 20  039 241 49               20  024           0004228 45ML43MN
FRB  7909040911P  A1206                      A1329           02  126  05         8 1
FRB   NW 0868KM 20 -029 326 49               20  024           0000125 35ML31MN
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SIC  7909040911P   1218                          1351            03  251  30        8 1
SIC   SW 0978KM 05 -172 216 49                   05 -119            0000250 42ML35MN
MNQ  7909040911P  C1225                          C1401           010 813 095        8 1
MNQ   SW 1022KM 01 -014 224 49                   01 -063            0000734 42ML40MN
PBQ  7909040911P   1248                           1439           03   90  09        8 1
PBQ   W  1195KM 05  180 266 49                   05  062            0000209 43ML35MN
LAQ  7909040911P  C1251                          B14416          016 976 130        8 1
LAQ   W  1218KM 01  197 258 49                   05 -171            0000523 45ML39MN
LDQ  7909040911P                                  1446           02  148  20        1 1
LDQ   W  1243KM          258 49                  05 -259            0000425 45ML39MN
LBQ  7909040911P   1253                           1450           02  738  65        8 1
LBQ   W  1253KM 05 -024 257 49                   05 -067            0000277 43ML37MN
LGQ  7909040911P   1252                           1452           01  421  20        8 1
LGQ   W  1267KM 05 -289 258 49                   05 -154            0000298 41ML37MN
LMQ  7909040911P                                  1515           02  289  05        8 1
LMQ   SW 1363KM          220 49                  05  095            0000054 37ML30MN
             Z


+56.150- 58.877F1ML=3.6 2352383 02071982 00.2370.193 0.2  3  6  20.85 218.00   0 1MN=0.0   00   0 3.65
$+56.18 - 59.11  ML=3.6  CEEF
$ LABRADOR SHELF
$ COMPARE WITH 790404
$
SCH  8207022354P  A5348                          A5439              20 107  20       8 1
SCH   W  0522KM 16  028 257 49                   16  025              0000587 35ML34MN
MNQ  8207022354P   5434                           5600   X5650                       8 1
MNQ   SW 0908KM 04 -081 231 49                   04 -091 00  288      0000000 00ML00MN
JAQ  8207022354P   5456                           5640                20 503  15       8 1
JAQ   W  1108KM 04 -320 263 49                   04 -347              0000094 37ML31MN
             Z


+56.531- 59.073F1MN=3.4 1530270 20081983 00.0340.050 0.3  4  7  70.30 218.00   0 1ML=4.2  10   0 3.65
$ 56.39  59.21  MN=3.3  CEEF
$ LABRADOR SHELF
$ FRB, STJ NOT READ
$
SCH  8308201530P  A313650                        A322750         030 137 120
SCH   W  0521KM 15  012 252 49                   15  010            0001835 42ML39MN
CBK  8308201530P                                 A33375  X3421   040 261 019
CBK   S  0851KM          175 49                  15  000 00  074    0000114 38ML30MN
SIC  8308201530P                                         X3431   040 165 030
SIC   SW 0872KM          219 49                          00  492    0000286 42ML34MN
MNQ  8308201530P   322500                         335350 X344300 030 295 023
MNQ   SW 0926KM 04 -075 228 49                   04 -004 00  212    0000163 39ML32MN
LQQ  8308201530P   32296                          3400   X34545  040 074 012
LQQ   W  0965KM 04 -086 258 49                   04 -175 00  314    0000255 43ML35MN
GSQ  8308201530P                                         X35055  0501660 300
GSQ   SW 1006KM          216 49                          00  276    0000227 44ML34MN
LMQ  8308201530P                                         X3621   050 092 006
LMQ   SW 1261KM          222 49                          00  848    0000082 42ML32MN
```

```
             Z

+57.287- 58.167F1ML=4.3 0200169 08011986 00.0280.120 0.4  9 15  61.17 218.00   0 1MN=0.0  00  0 3.65
$57.290- 58.160  ML=4.3 0200150 CEEF
$ LABRADOR SHELF
$ FRB MAGNITUDE CHECKED AND AS WRITTEN
$ MNQ DEAD
$ NOT IN EDR.
$ AFTERSHOCK ON JAQ AT 02:14
$
SCH  8601080200P  A01363     0.00          A02354         020 141 167    0  8
SCH   SW 0603KM 18  002 247 49             18  068          0003721 46ML43MN
FRB  8601080200P  A0216      0.00          A03405         030 141   8    0  8
FRB   NW 0917KM 18  149 326 49             18 -092          0000119 38ML31MN
CBK  8601080200P   0216      0.00           03435         050  88  16    0  8
CBK   S  0932KM 04 -037 179 49             04 -117          0000228 43ML34MN
GSQ  8601080200P   0236     -0.21           0422          040 141  30    0  8
GSQ   SW 1107KM 04 -188 216 49             04 -004          0000334 46ML37MN
JAQ  8601080200P   0244      0.00           0433          020 628 155    0  8
JAQ   W  1171KM 04 -155 258 49             04 -258          0000775 47ML41MN
KLN  8601080200P  X0257     -0.30                         020 314  11    0  8
KLN   SW 1290KM 00 -333 209 49                              0000110 40ML33MN
LPQ  8601080200P   0307     -0.21           0516          000   0   0    0  0
LPQ   SW 1367KM 04 -261 221 49             04 -141          0000000 00ML00MN
GGN  8601080200P   0321     -0.30          X0538          000   0   0    0  0
GGN   SW 1481KM 04 -262 208 49             00 -378          0000000 00ML00MN
GAC  8601080200P   03535     0.00                         000   0   0    0  0
GAC   SW 1754KM 04 -307 230 49                              0000000 00ML00MN
IGL  8601080200P  X0354      0.00           0641          000   0   0    0  0
IGL   NW 1774KM 00 -495 329 49             04 -264          0000000 00ML00MN
EEO  8601080200P  X0403      0.00                         000   0   0    0  0
EEO   SW 1851KM 00 -475 239 50                              0000000 00ML00MN
             Z

+57.287- 58.082F1ML=3.6 0212155 08011986 00.0770.089 0.5  4  8  30.65 218.00   0 1MN=0.0  00  0 3.65
$57.290- 58.160O1MN=3.0 0212150 CEEF
$ LABRADOR SHELF
$ AFTERSHOCK OF ML=4.3 AT 2000
$ FREE LOCATION IS CLOSE TO MAINSHOCK (57.287, 58.167)
$ MNQ DEAD.
$ FRB VERY WEAK PHASES, FOUND BY COMPARSION WITH MAINSHOCK ON FRB.
$ CBK READINGS LOOK GOOD, HAVE ATTENUATED LG.
$ CBK READINGS AT 1716 AND 1842 HAVE BEEN CORRECTED BY 3 MIN.
$ JAQ HAS NO LG FOR THIS OR FOR MAINSHOCK.
$
SCH  8601080212P  A13356     0.00          A14345         020 141  13    0  8
SCH   SW 0608KM 19  013 247 49             19  016          0000290 35ML32MN
FRB  8601080212P  C14180                   C1539                         0  8
FRB   NW 0920KM 01  452 326 49             01 -165          0000000 00ML00MN
CBK  8601080212P   1416                     1542          040 132 020       8
CBK   S  0932KM 05  101 179 49             05 -128          0000238 42ML34MN
JAQ  8601080212P   14425     0.00           1633          0101156   9    0  8
```

```
JAQ   W  1176KM 05 -227 258 49              05 -226           0000049 32ML29MN
             Z

+57.353- 59.204F1MN=4.8 0959549 20041986 00.0400.152 0.2 39 46 150.00N218.00   0 1ML=5.2  50F 0 3.57
$+57.384 - 59.509  MN=4.8  0959542  CEEF
$+57.42 - 60.255   MB=4.7  0959542  NEIS
$ PEGGED AT LOCATION DERIVED USING SCH, FRB, CBK, AND STJ ONLY.
$ WITH ALL PHASES BELOW GIVES:
$+57.225- 59.61001MN=4.8 0959563 20041986 00.0330.119 0.2 39 46 151.83 218.00   0 1ML=5.2  50F 0 3.5
$ LABRADOR SHELF
$ FELT BY SEVERAL PEOPLE WHO WERE         A NAIN AU LABRADOR PLUSIEURS PERSONNES
$ AWAKENED IN NAIN LABRADOR. WINDOWS      FURENT REVEILLEES. FENETRES ET
$ AND DISHES RATTLED.                     VAISSELLE ONT VIBRE
$ NOT FELT 90 KM S OF NAIN                NON RESSENTI 90 KM AU SUD DE NAIN
$ NOT FELT IN HOPEDALE - TRUDY FLOWERS    NON RESSENTI A HOPEDALE - TRUDY FLOWERS
$ AND HULDA PIJOGGE, LABRADOR             ET HULDA PIJOGGE, LABRADOR
$ CONTACT VICKEY WILLIAMS, TOWN COUNCIL NAIN 709-922-2842
$ KLN GGN HTQ LPQ DOWN
$ FOCAL MECHANISM BY ADAMS.
$ SG VELOCITY AT 3.57 KM/S
$
ASPA 8604201005P  X19322 +
SPA  8604201005P  X1938  +
SCH  8604201001P  A01080 C   0.00                        050 1021000    0  8
SCH   SW 0550KM 20  027 242 49                              0012320 53ML47MN
FRB  8604201001P  A0148  -   0.00          0311          050 101 100    0  8
FRB   NW 0877KM 20  044 328 49            05 -034           0001244 49ML41MN
SIC  8604201005P  A01543 D
SIC   SW 0941KM 20 -106 215 49                              0000000 00ML00MN
CBK  8604201001P  A0155  +   0.00          03245         040 132 300    0  1
CBK   S  0943KM 20 -064 174 49            05 -096           0003570 54ML46MN
MNQ  8604201001P    015910C   0.00          033340 X043125 040 100 331    0  0
MNQ   SW 0985KM 05 -163 224 49            05 -093 00  049   0005199 56ML48MN
HTQ  8604201002P    021188D   0.00          035702 X045834 070 100 750    0  0
HTQ   SW 1095KM 05 -225 218 49            05 -068 00 -328   0006732 60ML50MN
JAQ  8604201002P    021450D   0.00          035735 X050170 057 100 678    0  0
JAQ   W  1112KM 05 -175 256 49            05 -407 00 -475   0007474 60ML50MN
STJ  8604201002P    0226  E   0.00          0418          050  24  10    0  8
STJ   SE 1174KM 05  225 155 49            05  350           0000524 49ML39MN
EBN  8604201002P    023305D  -0.21        XB043237 X054650 083 100 580    0  0
EBN   SW 1260KM 05 -138 213 49            00 -060 00 -147   0004391 60ML49MN
SLQ  8604201005P    02336 D
SLQ   SW 1265KM 05 -134 216 49                              0000000 00ML00MN
GBN  8604201002P  A02432 D   0.00          X04495         050 113 150    0  8
GBN   S  1340KM 20 -079 188 49            00 -030           0001668 56ML45MN
UNB  8604201005P    02467 -
UNB   SW 1368KM 05 -075 205 49                              0000000 00ML00MN
HAL  8604201002P  A02555 D   0.00          X0512          090  59 100    0  8
HAL   S  1448KM 20 -171 194 49            00 -088           0001183 56ML44MN
GNT  8604201003P    030261D   0.00        XB052888 X070268 080 100 805    0  0
GNT   SW 1518KM 05 -316 222 49            00  107 00  241   0006322 64ML52MN
SBQ  8604201003P    031263    0.00        XB054039 X072062 070 100 307    0  0
SBQ   SW 1596KM 05 -259 219 49            00 -391 00 -129   0002756 61ML49MN
```

```
TRQ  8604201003P   031439C   0.00          XB054812 X072909 060 100 246     0  0
TRQ   SW 1624KM 05 -429 227 49              00 -221 00 -062   0002576 60ML48MN
GRQ  8604201003P   031756-    0.00         XC055349 X073145 047 100 157     0  0
GRQ   SW 1648KM 05 -405 231 49              00 -195 00 -512   0002099 59ML48MN
MNT  8604201003P  C031791     0.00         XC055294 X073770 077 100 338     0  0
MNT   SW 1651KM 01 -401 223 49              00 -305 00  035   0002758 61ML49MN
GAC  8604201003P   032521C    0.00         XC060492 X075056 000   0    0    0  0
GAC   SW 1712KM 05 -415 228 49              00 -404 00 -387   0000000 00ML00MN
IGL  8604201003P   03302      0.00          0610             040 235  75    0  0
IGL   NW 1735KM 05 -201 330 49              05 -395           0000501 52ML42MN
WBO  8604201003P  C033334     0.00         XB062005 X080854 093 100 300     0  0
WBO   SW 1768KM 01 -283 226 49              00 -080 00 -153   0002027 61ML48MN
KAO  8604201005P   03303 +
KAO   W  1770KM 05 -616 250 49                                0000000 00ML00MN
CKO  8604201005P         C
CKO   SW 1777KM         232 49                                0000000 00ML00MN
EEO  8604201003P   033409-    0.00         XB062046 X081604 053 100 172     0  0
EEO   SW 1802KM 05 -594 237 52              00 -765 00 -351   0002039 60ML48MN
SUD  8604201005P   0348  C
SUD   SW 1913KM 05 -475 240 50                                0000000 00ML00MN
WEO  8604201004P  C040109     0.00          X071023 X091190 053 100 137     0  0
WEO   SW 1997KM 01 -098 230 47              00  061 00 -234   0001624 60ML48MN
GTO  8604201005P  A03582 D
GTO   W  2009KM 20 -515 257 47                                0000000 00ML00MN
FCC  8604201004P   04041 D    0.00          X0712    X0925   130  45 125    0  0
FCC   W  2045KM 05 -309 289 47              00 -778 00 -266   0001343 59ML47MN
BLC  8604201004P   04127 D    0.00          X0727   XC0944   080 130 130    0  0
BLC   NW 2114KM 05 -186 307 45              00 -744 00 -297   0000785 58ML45MN
SXO  8604201005P   04321 +
SXO   W  2286KM 05 -006 263 41                                0000000 00ML00MN
ULM  8604201005P   04525 -
ULM   W  2510KM 05 -076 267 37                                0000000 00ML00MN
FFC  8604201005P   05063 -
FFC   W  2641KM 05  133 282 36                                0000000 00ML00MN
ALE  8604201005P   05230 +    0.00                         000   0    0     0  0
ALE   N  2812KM 05  351 359 35                                0000000 00ML00MN
B10  8604201005P  A05410 E    0.00                         000   0    0     0  0
B10   NW 3052KM 20  184 304 33                                0000000 00ML00MN
BMS  8604201005P  A0546
BMS   W  3110KM 20  208 273 33                                0000000 00ML00MN
MBC  8604201005P   05490 +    0.00                         000   0    0     0  0
MBC   NW 3147KM 05  227 334 33                                0000000 00ML00MN
EDM  8604201005P   0607  C
EDM   W  3382KM 05  131 286 33                                0000000 00ML00MN
SES  8604201005P   06100 C
SES   W  3411KM 05  199 279 33                                0000000 00ML00MN
INK  8604201005P  A06340 C
INK   NW 3717KM 20  195 319 32                                0000000 00ML00MN
BDW  8604201005P   0642  +
BDW   W  3846KM 05 -046 267 32                                0000000 00ML00MN
PNT  8604201005P  X06557 C
PNT   W  3986KM 00  262 284 32                                0000000 00ML00MN
BNG  8604201005P  X12113 +
BNG   E  8860KM 00 1024$098 19                                0000000 00ML00MN
```

Z

```
+54.263- 54.73901MN=4.6 0604574 24091986 00.0270.053 0.2 22 30 141.17 218.00    0 1ML=0.0   00   0 3.65
$54.374  54.998  MN=4.5 0604569  CEEF
$54.082 +/- 7.2KM     55.166 +/- 6.6KM  MB=4.2  PDE
$ NOT REPORTED FELT                       PAS RAPPORTE COMME AYANT ETE RESSENTI
$ S PHASE IS BAD ON IGL BUT IS THE BEST POSSIBLE READING
$ NOTHING FROM BLC, FSB, FST, HYT, RES AND WHC.
$ STJ LOOKS ATTENUATED.
$ NEEDS FOCAL MECHANISM TRIED.
$ POSSIBLE DEPTH PHASES ON VARIOUS STATIONS. (EG 0752 JAQ)
$ EG MNQ:  07.0D,  08.4-.  09.6+
$
CBK   8609240604P  A06195 C         X06375     A07225   0749    40 132 325
CBK    S  0636KM 20 -116 202 49     00 -247   20  046 05 -263    0003867 50ML43MN
MUN   8609240604P  A06351                     XA0749   X0832    40  73 110
MUN    S  0758KM 20 -048 168 49                00  094 00  680    0002367 49ML43MN
STJ   8609240604P XA06350 +   0.00             A07495  X08320  100   9  30    0  3
STJ    S  0758KM 00 -058 168 49                20  143 00  679    0002094 50ML42MN
SCH   8609240604P  A06380 C   0.00             A07545   08301  030 137 530    0  0
SCH    W  0782KM 20 -051 279 49                20  133 05 -157    0008102 54ML48MN
MNQ   8609240604P   070700D  -0.10              084759  0942   030 419 700    0  0
MNQ    W  1040KM 05 -313 252 49                05 -067 05 -057    0003499 54ML47MN
GBN   8609240604P   07145 D                     09005  X10005   60  94 173
GBN    SW 1099KM 05 -260 209 49                05 -001 00  203    0001927 55ML44MN
KLN   8609240604P   072381C  -0.29                     X102307 090  34 260    0  0
KLN    SW 1165KM 05 -167 230 49                        00  622    0005339 60ML49MN
SLQ   8609240604P   07325 +                   XC0933   X1031    70 127 270
SLQ    SW 1240KM 05 -184 239 49                00  242 00 -612    0001908 56ML45MN
HAL   8609240604P  C07315                       09295  X1041    40 157  74        3
HAL    SW 1247KM 01 -369 214 49                05 -257 00  189    0000740 50ML41MN
UNB   8609240604P   07339 E                    X0929
UNB    SW 1254KM 05 -216 227 49                00 -459            0000000 00ML00MN
FRB   8609240604P   07455 E                    X09545
FRB    NW 1317KM 05  178 329 49                00  755            0000000 00ML00MN
LMQ   8609240604P   07417 -                    X09475             60  68 185
LMQ    SW 1323KM 05 -283 242 49                00 -086            0002849 58ML47MN
GGN   8609240604P  C074298C  -0.29             X094875 X1112   070 115 215    0  0
GGN    SW 1337KM 01 -348 225 49                00 -277 00  793    0001678 56ML45MN
JAQ   8609240604P  C074750-  -0.07             X0955   X1115   030 838 795    0  0
JAQ    W  1372KM 01 -305 276 49                00 -382 00  154    0001987 55ML46MN
EMM   8609240604P  C07508     0.00                             000   0   0    0  0
EMM    SW 1402KM 01 -330 226 49                                   0000000 00ML00MN
QCQ   8609240604P                                                 70  16  47
QCQ    SW 1434KM          241 49                                  0002637 59ML48MN
MIM   8609240604P  C07545     0.00                             000   0   0    0  0
MIM    SW 1434KM 01 -354 231 49                                   0000000 00ML00MN
TRQ   8609240604P  X082150C  -0.09             X1103   X12345  090 114 180    0  0
TRQ    SW 1665KM 00 -489 246 49                00  168 00  068    0001102 57ML45MN
RSNY  8609240604P  X08368     0.00                             000   0   0    0  0
RSNY   SW 1789KM 00 -424 241 52                                   0000000 00ML00MN
EEO   8609240604P  X085130E  -0.06                     XB13465 070 115 235    0  0
EEO    W  1914KM 00 -406 254 50                        00  475    0001834 61ML48MN
```

```
IGL  8609240604P   09242 -    0.00            X1253           000   0   0    0  0
IGL   NW 2173KM 05  097 331 43                00  392           0000000 00ML00MN
EFO  8609240604P                                     XC1500
EFO   SW 2179KM          245 43                       00  569   0000000 00ML00MN
LHC  8609240604P  C09549                                         60  55  23
LHC   W  2467KM 01  299 269 39                                  0000438 56ML44MN
DAG  8609240604P   1031
DAG   N  2913KM 05  065 018 34                                  0000000 00ML00MN
FFC  8609240604P XC1044  +
FFC   W  3006KM 00  602 290 33                                  0000000 00ML00MN
ALE  8609240604P
ALE   N  3164KM          358 33                                 0000000 00ML00MN
MBC  8609240604P   11245 +
MBC   NW 3577KM 05  096 336 32                                  0000000 00ML00MN
SES  8609240604P   11394 D
SES   W  3763KM 05  111 287 32                                  0000000 00ML00MN
INK  8609240604P   12092 +
INK   NW 4161KM 05  032 323 31                                  0000000 00ML00MN
           Z

+56.648- 56.261F1ML=4.6 2109309 14121987 00.0160.056 0.2 14 25 120.97 218.00   0 1MN=4.1  30  0 3.65
$56.854- 56.124F1ML=4.6 2109266 CEEF
$ LABRADOR SHELF                            MER DU LABRADOR
$ NOTHING ON GNT, SBQ, OTT, CKO, WEO, WBO
$ MNQ HAS A SEMI LG WAVE
$ CBK HAS 30 MINUTES, 00.1 SEC TIME CORRECTION
$ INK, YKA READ BY OPERATOR.
$ NOT IN PDE
$
SCH  8712142109P  A11022     0.00            A12075          020 141 400    0  8
SCH   W  0692KM 19  119 257 49               19  002           0008912 51ML48MN
CBK  8712142109P  A11221     0.00            A1245           050  95 260    0  0
CBK   S  0868KM 19 -045 188 49               19 -007           0003439 54ML45MN
SIC  8712142109P   1138  D   0.00             1313           030 257  69    0  8
SIC   SW 1001KM 05 -075 228 49               05 -033           0000562 46ML38MN
MUN  8712142109P  X1143                      X1325            30  91  36    0  0
MUN   S  1039KM 00 -032 165 49               00  370           0000829 48ML40MN
STJ  8712142109P   1143      0.00             13215          040  29   7    0  8
STJ   S  1039KM 05 -033 165 49               05  019           0000379 46ML37MN
FRB  8712142109P  A1145                      A13205           50 101  35    0  0
FRB   NW 1042KM 19  133 324 49               19 -142           0000435 47ML38MN
MNQ  8712142109P   114526C  -0.10             132662         027 100  23    0  8
MNQ   SW 1071KM 05 -206 236 49               05 -158           0000535 46ML39MN
GSQ  8712142109P   115407C  -0.22             134082         023 100  18    0  8
GSQ   SW 1128KM 05 -039 225 49               05  024           0000492 45ML39MN
HTQ  8712142109P   115651   -0.07             134635         033 100  15    0  8
HTQ   SW 1162KM 05 -186 229 49               05 -115           0000286 45ML36MN
JAQ  8712142109P  X120880   -0.07             141282         017 100  19    0  8
JAQ   W  1275KM 00 -339 264 49               05  120           0000702 47ML41MN
KLN  8712142109P   121337   -0.29             141527         047 100  18    0  8
KLN   SW 1293KM 05 -131 217 49               05 -052           0000241 47ML36MN
GBN  8712142109P   1214      0.00             14175          030 188  38    0  8
GBN   S  1304KM 05 -162 198 49               05 -016           0000423 47ML39MN
```

```
EBN  8712142109P XB121570    -0.22          X142233        037 100  12     0  8
EBN    SW 1309KM 00 -077 224 49             00  336          0000204 45ML36MN
LMN  8712142109P XB121823    -0.29         XB142822        0301000  58     0  8
LMN    SW 1340KM 00 -211 210 49             00  255          0000121 42ML34MN
LPQ  8712142109P   122594    -0.22           143859        037 100  11     0  8
LPQ    SW 1398KM 05 -135 228 49             05  074          0000187 45ML36MN
GGN  8712142109P XB123586    -0.29                         000    0    0    0  0
GGN    SW 1480KM 00 -153 214 49                              0000000 00ML00MN
TRQ  8712142109P  X130168    -0.09                         000    0    0    0  0
TRQ    SW 1713KM 00 -404 235 49                              0000000 00ML00MN
GRQ  8712142109P  X130472    -0.09                         000    0    0    0  0
GRQ    SW 1749KM 00 -524 239 49                              0000000 00ML00MN
GAC  8712142109P XB131326    -0.06                         000    0    0    0  0
GAC    SW 1804KM 00 -305 236 52                              0000000 00ML00MN
EEO  8712142109P  X132476    -0.06                         000    0    0    0  0
EEO    SW 1919KM 00 -473 244 50                              0000000 00ML00MN
YKA  8712142109P    15322                                                      0
YKA    NW 3247KM 05  138 306 33                              0000000 00ML00MN
INK  8712142109P    16220                                                      0
INK    NW 3892KM 05  028 321 32                              0000000 00ML00MN
                 Z
```

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**************************************************
*                                                *
*  SOUTHERN LABRADOR - EASTERN QUEBEC EARTHQUAKES *
*                                                *
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```
+50.972- 63.136F MN=4.1 1610356 21111955 00.0280.034 0.2  5 13  40.48 218.00   0 1ML=0.0  00  0 3.65
$50.580- 63.500  MN=4.0 --- FROM CEEF AND SMITH
$50.6  - 63.5    MN=4.0 ---(BASHAM 1982)  CEEF
$ EASTERN QUEBEC.
$ SFA, KLC TIME CORRECTION IS ASSUMED, IN ORDER TO IMPROVE AGREEMENT IN H TIME
$ LG VEL ASSUMED TO BE 3.65
$ SFA, SHF, KLC, OTT: RE-READ FROM PART OF ORIGINAL RECORD IN SMITH'S CARD FILE
$ HAL RE-READ FROM PART OF ORIGINAL RECORD IN SMITH'S CARD FILE; LG ATTENUATED
$ SFA AND SHF PN'S ASSUMED TO BE RELATIVELY UNCERTAIN
$ OTT LG APPARENTLY GOOD, BUT FAR TOO EARLY; PN POOR; RE-READ ON SPZ BENIOFF
$
HAL  5511211610P  A12071                       A13155   1347    60  90  50       33      33
HAL    S  0706KM 17 -033 183 49                17  035 04 -206   0000582 44ML36MN
SFA  5511211610P  A12013    +6.5               A1309    1341    60  55  91
SFA    SW 0707KM 17  023 236 49                17  013 04 -181   0001733 48ML41MN
SHF  5511211610P    1227                        13475  X14255   60  15  25
SHF    SW 0861KM 04  057 239 49                04 -076 00 -621   0001745 51ML42MN
OTT  5511211610P    12565                       1443  XA1529    50 151  63
OTT    SW 1121KM 04 -158 241 49                04 -050 00 ****$  0000524 49ML39MN
KLC  5511211610P    13185    -3.2  C14033       15162  X16175   90  10  13
KLC    W  1260KM 04  023 262 49    01  118     04 -013 00 -661   0000908 53ML42MN
              Z
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+52.882- 59.2230 MN=4.1 0423121 20121962 00.0380.069 0.0  3  6  10.37 218.00   0 1ML=4.6  10  0 3.65
$52.8    59.4    ML=4.4 042312  --CEEF AFTER SMITH
$ SOUTHERN LABRADOR.
$ POORLY LOCATED DESPITE MAGNITUDE
$ SHF RECORD FOGGED.
$ SFA NOT OPERATING.
$ HAL LG SUSPECTED ATTENUATED, THEREFORE LG ARRIVAL READING NOT USED
$ NEED OTT AND HAL SN READINGS
$
SCH  6212200423P  A2424            C2435      A2517    2540    050 113 2500
SCH    NW 0542KM 17 -006 296 49    01 -470    17  001 04 -086   0002780 46ML41MN
HAL  6212200423P                                      X2800
HAL    S  0972KM         201 49                       00 2157$  0000000 00ML00MN
OTT  6212200423P                                      B2953
OTT    SW 1459KM         242 49                       04  102   0000000 00ML00MN
RES  6212200423P                                      B3630
RES    N  2908KM         339 34                       04  122   0000000 00ML00MN
```

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              Z

+53.105- 59.3300 MN=3.3 0853013 04041963 00.1360.197 0.0  2  5  10.83 218.00   0 1ML=3.6  10  0 3.65
$53.4    59.7    ML=3.5 085306 --CEEF AFTER SMITH
$ SOUTHERN LABRADOR.
$ SMITH CHOSE THIS EPICENTRE OVER 53N, 74W BECAUSE EQ WAS NOT RECORDED AT SFA
$ ORIGINAL RECORDS NOT SEEN; UNLIKELY TO HAVE BEEN RECORDED ELSEWHERE
$ CHECK FOR HAL SN READING, AND SIC PN READING.
$
SCH  6304040853P  A5411          C5423      A5503    5521     30 188  40
SCH   NW 0525KM 15 -017 294 49   01 -313    15  046 04 -436    0000446 36ML33MN
SIC  6304040853P                                     5548
SIC   SW 0608KM         240 49                      04  000    0000000 00ML00MN
STJ  6304040853P
STJ   SE 0774KM         140 49                                 0000000 00ML00MN
              Z

+51.481- 62.7330 MN=2.9 0849473 25101963 00.0690.223 0.0  2  4  20.92 218.00   0 1ML=3.0  20  0 3.65
$51.4    61.9    ML=3.3 084939  --CEEF AFTER SMITH
$ EASTERN QUEBEC.
$ SMITH CHOSE THIS EPICENTRE OVER WESTERN ONE BECAUSE EQ WAS NOT RECORDED AT SFA
$ ORIGINAL RECORDS NOT SEEN; UNLIKELY TO HAVE BEEN RECORDED ELSEWHERE
$ CHECK SCH SN AND PN READING.
$
SIC  6310250849P  A5033                             A5114    30 188  45
SIC   SW 0318KM 10  119 244 49                      10 -052   0000501 29ML30MN
CBK  6310250849P
CBK   SE 0444KM         128 49                                0000000 00ML00MN
SCH  6310250849P  A5048                             A5154    30 168  20
SCH   NW 0460KM 10 -118 325 49                      10  053   0000249 32ML29MN
              Z

+53.461- 57.089F MN=3.7 2034043 15101966 00.0650.115 0.3  4  8  61.20 218.00   0 1ML=0.0  00  0 3.65
$+53.42 - 57.17  ML=4.4 CEEF
$ SOUTHERN LABRADOR  LOCATED NEAR SANDWICH BAY.
$ ORIGINAL RECORDS RE-READ 880414 - ADAMS AND SIMMONS
$ THESE AGREE WELL WITH WAHLSTROM'S PRIOR READINGS.
$ ABSENT IN BASHAM ET AL. (1982). HAL, FBC MAG. MAY BE LOW DUE TO LG ATTENUATION.
$ LG ON HAL, STJ, FRB RPOBABLY ATTENUATED SO NOT USED ON MAGNITUDE.
$ HAL TC IS OK.
$ SIC SN IS NOT GOOD.
$ STJ POSSIBLE TIMING ERROR, NOT CONFIRMED.
$
SCH  6610152039P  A35302              A36342  A37012   60  59  97        1
SCH   W  0652KM 11  065 287 49        11  183 11 -171   0001722 48ML40MN
STJ  6610152039P XB3545                       XC3731   50  76  12      3 1
STJ   SE 0725KM 00  660 153 49                 00  809  0000198 39ML31MN
SIC  6610152039P  A35420             XB36598  A37330   30 160 110        1
SIC   SW 0759KM 11 -065 245 49        00  456 11  060   0001440 46ML40MN
HAL  6610152039P  A36225              C38074 XC39104   40 105   8      3 1
HAL   SW 1090KM 11 -048 208 49        01  180 00  737   0000120 41ML32MN
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SFA   6610152039P                                 XB39389   70  40   8          1
SFA    SW 1204KM          240 49                   00  463   0000180 46ML35MN
FBC   6610152039P                                  X40087   50 110   6        3 1
FBC    NW 1319KM          335 49                   00  295   0000069 42ML31MN
GWC   6610152039P                         B3858   XB40135   60  63  10          1
GWC    W  1355KM          287 49          03 -388 00 -200    0000166 46ML35MN
MNT   6610152039P                                  X40530   50 117  14          1
MNT    SW 1485KM          240 49                   00  180   0000150 46ML35MN
OTT   6610152039P                                 XC41305   50  48   6          1
OTT    SW 1616KM          244 49                   00  346   0000157 47ML36MN
             Z

+51.791- 58.858O MN=3.0 0335390 02111967 00.0890.083 0.1  3  6  20.69 218.00   0 1ML=3.4  10  0 3.65
$52.20    58.40   ML=3.4   CEEF
$ EASTERN QUEBEC.
$ NEEDS SCH AND STJ TO BE READ FOR OTHER PHASES.
$ CHECK HAL READINGS.
$ SCH RECORD - ONLY GOOD PHASE IS LG
$
SIC  6711020335P  A36556          C37106     A37521   38221   30 160  17
SIC    W  0582KM 17 -018 255 49   01 -240    17 -019 04  347   0000223 34ML30MN
SCH  6711020335P                 XC3713     XC38035   38322   40  99   9
SCH    NW 0627KM         306-88   00 -719    00  168 04  136   0000143 35ML29MN
STJ  6711020335P                                      38370
STJ    SE 0645KM         134 49                       04  122   0000000 00ML00MN
             Z

+49.597- 60.917O MN=3.1 0139112 13101973 00.0310.106 0.6  4  6  40.60 218.00   0 1ML=3.6  10  0 3.65
$49.57  61.36  MN=3.1     CEEF
$ ST LAWRENCE OFF EASTERN QUEBEC.
$ GOOD ON SCH
$ NOT ON OTT, MNT, OR SFA
$ UNB SN PROBABLY NOISE
$ CHQ MAGNITUDE TOO LOW TO INCLUDE
$ STJ, SIC WAS NOT OPERATING AT THIS TIME.
$ HAL AMPLITUDE NEGLECTED DUE TO SUSPICION OF RAPID ATTENUATION.
$ SFA: POSSIBLY VISIBLE AT 0142 (WAHLSTROM)
$ SCH,HAL,CHQ,UNB,PBQ CHECKED BY ADAMS OCT 88
$
HAL  7310130139P                                    4152    50  82   6        3
HAL    S  0588KM         201 49                    05 -033   0000092 32ML27MN
UNB  7310130139P                           X4119    4154    50  73  12
UNB    SW 0591KM         229 49            00 -727 05  082   0000207 36ML30MN
SCH  7310130139P  A4043                     4153    4225    30 105  35
SCH    NW 0706KM 21 -009 328 49            05  213 05  025   0000698 42ML37MN
CHQ  7310130139P                           X4223   X4308    40 125   2        3
CHQ    W  0828KM         253 49            00  636 00  999   0000025 31ML23MN
PBQ  7310130139P                                   B4507    60  66   6
PBQ    NW 1304KM         305 49                    05 -145   0000095 43ML33MN
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              Z

+51.323- 62.5470 MN=3.3 1237136 23101973 00.0820.440 0.2  2  6  50.67 218.00   0 1ML=3.7  10  0 3.65
$51.26   62.39   ML=3.2  --CEEF AFTER SMITH
$ EASTERN QUEBEC.
$ UNB IS 10 SECONDS TOO EARLY FOR SN.
$ SCH, POC PN VERY POOR.
$ VERY POOR PHASES, POORLY LOCATED.
$
SCH  7310231239P XC3812          C38265     A39055  B39265   20 104  34
SCH   NW 0482KM 00 -613 326 49   01 -489    23 -005 06  077   0001027 37ML36MN
UNB  7310231239P                            X3922            40  80  10
UNB   SW 0669KM         208 49              00 ****$          0000196 37ML31MN
POC  7310231239P  C3750     +60.0           C3900   B3925    30 153  20
POC   SW 0700KM 01  528 234 49              01  806 06 -054   0000274 38ML33MN
SFA  7310231239P                            X4015   X4050    30  67  10
SFA   SW 0763KM         235 49              00  975 00  737   0000313 39ML34MN
CHQ  7310231239P                                    X4054    30 153  13
CHQ   SW 0807KM         236 49                      00 -074   0000178 38ML32MN
              Z


+51.878- 58.083F1MN=3.4 0539268 05011979 00.1060.188 0.0  5  9  11.63 218.00   0 1ML=3.2  10  0 3.65
$ EASTERN QUEBEC.
$ CBK: LABLED 1 SEC FAST ON RECORD, THIS T.C. USED
$ NOT A SATISFACTORY SOLUTION
$ ALL PHASES ARE WEAK, EXCEPT CBK, WHICH HAS DUBIOUS TIMING
$ THE ADOPTED EPICENTRE IS CONSISTENT WITH CBK SN-PN
$   AND FITS THE THREE PHASES ON MNQ REASONABLY WELL
$
CBK  7901050540P  A4013      -1.0           A40475  X4053    20 138  54          1
CBK   S  0329KM 19 -071 179 49              19  022 00 -519   0001229 32ML34MN
STJ  7901050540P                 X4106      X4203    42195                       1
STJ   SE 0615KM         139-88   00 -006    00 1599$05  410   0000000 00ML00MN
SIC  7901050540P                 C4111                                           1
SIC   W  0636KM         256-88   01  152                      0000000 00ML00MN
SCH  7901050540P                  41095      42036                               1
SCH   NW 0665KM         303-88   05 -468    05  579           0000000 00ML00MN
MNQ  7901050540P   4109                      4216    4257                        1
MNQ   W  0762KM 05  351 263 49              05 -235 05  137   0000000 00ML00MN
              Z

+52.634- 62.694F1MN=2.9 0001473 22111981 00.0400.090 0.2  4  8  30.80 218.00   0 1ML=2.3  30  0 3.65
$52.730   62.950  MN=2.7  CEEF
$ SOUTHERN LABRADOR
$
SCH  8111220003P  A0238                             03255    03 105  02
SCH   NW 0364KM 16  056 314 49                      04 -158   0000399 20ML30MN
SIC  8111220003P
SIC   SW 0393KM         227 49                                0000000 00ML00MN
MNQ  8111220003P  A0251                     A0340   X0353    01 503  015
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MNQ   SW 0482KM 16 -090 243 49              16  065 00 -653   0000125 14ML27MN
CBK  8111220003P XC03075          XC03265    0350  XC0410    40  66  12
CBK   SE 0531KM 00  964 139 49    00 1343$  04  026 00 -294   0000286 35ML31MN
JAQ  8111220003P   0340                      0503     0546   03 314  005
JAQ   W  0879KM 04 -033 284 49              04 -085 04 -235   0000000 00ML00MN
             Z

+51.219- 59.608F1MN=3.5 0617560 10041982 00.0470.059 0.2 11 21 101.31 218.00   0 1ML=3.6  30  0 3.65
$51.15  59.64  MN=3.2  CEEF
$ EASTERN QUEBEC COAST
$
CBK  8204100619P  A18336 D  +1.7 XC18415    A19045 XC19165   40  66 145
CBK   SE 0282KM 27 -086 155 49    00  161   27  082 00  481   0003451 37ML37MN
SIC  8204100619P XB19148                    C1957  C2017     40 188  36
SIC   W  0517KM 00  991 260 49              02  149 02 -089   0000301 35ML31MN
GSQ  8204100619P                            C20138  B2040    30 105  23
GSQ   SW 0595KM           247 49            02  167 07  075   0000459 37ML34MN
SCH  8204100619P  B19185          X1937     C20246  B20498   30 105  47
SCH   NW 0626KM 07  027 313 49    00 -016   02  582 07  202   0000937 42ML37MN
MUN  8204100619P   19205          X20005    X2023   X2050    40  32  15
MUN   SE 0643KM 07  029 126 49    00 2065$  00  075 00 -235   0000736 43ML36MN
MNQ  8204100619P  B19176                    B20222  B20507   40 220  88
MNQ   W  0650KM 07 -348 267 49              07 -155 07 -348   0000628 42ML36MN
EBN  8204100619P                                    X2128
EBN   SW 0754KM           240 49                    00  538   0000000 00ML00MN
UNB  8204100619P                                    X2132
UNB   SW 0782KM           224 49                    00  163   0000000 00ML00MN
HAL  8204100619P   1937                      2053   X2142    5  79  03
HAL   SW 0790KM 07 -115 204 49              07 -055 00  936   0000477 34ML36MN
LMQ  8204100619P                             2114   X2204    02 290  05
LMQ   SW 0878KM           246 49            07  165 00  722   0000542 32ML37MN
JBQ  8204100619P                             2204
JBQ   W  1119KM           290 49            07  044           0000000 00ML00MN
JAQ  8204100619P  C20145                    C2206   B2309    40 220  19
JAQ   W  1130KM 02 -506 291 49              02  022 07  343   0000136 42ML33MN
JCQ  8204100619P                             2208
JCQ   W  1132KM           289 49            07  179           0000000 00ML00MN
PBQ  8204100619P                                    X2355    60  70 006
PBQ   NW 1289KM           298 49                    00  581   0000090 43ML32MN
FRB  8204100619P                           XC2328   X2459
FRB   N  1493KM           343 49            00  490 00 1380$  0000000 00ML00MN
            Z

+51.197- 62.194F1MN=3.4 0431011 03101982 00.0380.091 0.2  8 15  70.89 218.00   0 1ML=3.6  50  0 3.65
$51.250  62.810  MN=3.3   CEEF.
$ EASTERN QUEBEC
$ CBK NOT OPERATING.
$ MUN(STJ) TOO NOISY.
$
SIC  8210030432P  A31488          X31512            X32287   20 346  88
SIC   W  0341KM 14  029 252 49    00 -507           00 -605   0000799 31ML32MN
GSQ  8210030432P  A320065                   A32435  X32563   30 299 181
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GSQ   SW 0434KM 14  075 236 49                   14  051 00 -398   0001268 38ML36MN
MNQ  8210030432P  A320248                        A32510  X330592  24 352 155
MNQ   W  0469KM 14 -171 264 49                   14  052 00 -397   0001153 38ML36MN
HTQ  8210030432P  A32068                                 X33126   32 629 185
HTQ   SW 0496KM 14 -058 246 49                           00 -455   0000577 36ML33MN
SCH  8210030432P  A32094         C32215                   33188   30 105  50
SCH   NW 0508KM 14  055 324 49   01 -161                 04 -155   0000997 39ML36MN
KLN  8210030432P   321742                         3311   X33407
KLN   SW 0573KM 04  063 214 49                   04 -144 00  251   0000000 00ML00MN
EBN  8210030432P   32221                                  33447   321000 105
EBN   SW 0605KM 04  141 229 49                           04 -230   0000206 36ML30MN
LPQ  8210030432P   32347                                  34141   361153 170
LPQ   SW 0712KM 04  093 236 49                           04 -230   0000257 38ML32MN
             Z

+49.382- 64.24601MN=3.0 1526094 24021985 00.0280.044 0.2 12 25  81.04 218.00   0 1ML=3.0  80  0 3.65
$ 49.34  64.28  MN=3.0  CEEF
$ EASTERN QUEBEC
$ SW OF ANTOCOSTI ISLAND.
$ SIC RECORD OF POOR QUALITY.
$
SIC  8502241526P  A26388      0.00 C26398                  2702   000   0   0     0  0
SIC   NW 0200KM 20 -077 297 49    01 -205                 05 -248   0000000 00ML00MN
GSQ  8502241526P  A26418     -0.21                         27067  025 193 175     0  0
GSQ   W  0215KM 20  010 257 49                            05 -222   0002279 30ML33MN
HTQ  8502241526P  A26538      0.00                         2732   023 531 125     0  0
HTQ   W  0303KM 20  171 268 49                            05 -053   0000643 29ML30MN
KLN  8502241526P  A26543     -0.30               2727      2741   013 778  75     0  0
KLN   SW 0324KM 20 -068 210 49                  05 -104 05  239   0000466 26ML29MN
MNQ  8502241526P  A26576      0.00              X27265    27455   013 778  75     0  0
MNQ   NW 0349KM 20 -024 293 49                  00 -673 05  015   0000466 27ML30MN
SLQ  8502241526P   27055      0.00              X27475    27595   030 314  35     0  0
SLQ   SW 0400KM 05  146 243 49                  00  345 05  020   0000233 30ML28MN
CBK  8502241526P                   C2721         27595    2816     30 184  52.5
CBK   E  0461KM        094-87     01 -289       05  253 05  010   0000592 35ML33MN
LPQ  8502241526P   2715      -0.21                       X2827    000   0   0     0  0
LPQ   SW 0484KM 05  061 244 49                           00  469   0000000 00ML00MN
GBN  8502241526P   2715       0.00 C27303        28018    28205    40 150  13     0  0
GBN   SE 0488KM 05  032 154 49    01  208       05 -081 05 -274   0000136 31ML27MN
LMQ  8502241526P                                 28040
LMQ   W  0494KM         248 49                  05  006           0000000 00ML00MN
GGN  8502241526P             -0.30               28075            0171176  60     0  0
GGN   SW 0513KM         203 49                  05 -071           0000189 29ML29MN
HAL  8502241526P XC2727                          2813
HAL   S  0530KM 00  719 174 49                  05  142           0000000 00ML00MN
             Z

+50.551- 58.171F1MN=3.4 2219099 11121987 00.0300.045 0.3 14 28  81.09 218.00   0 1ML=3.6  30  0 3.65
$50.435- 58.303  MN=3.4 2219113 CEEF
$ BELLE-ISLE STRAIT                          DETROIT DE BELLE-ISLE
$ SIC PN VERY WEAK, MUCH MICROSEISMIC NOISE.
$ NOTHING EEO, GAC, LPQ, GRQ
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$
CBK   8712112219P  A19383      0.00          B1958            000   0    0      0  0
CBK    S  0182KM 18  044 175 49              04 -005            0000000 00ML00MN
MUN   8712112219P XB2022
MUN    SE 0518KM 00  327 128 49                                 0000000 00ML00MN
STJ   8712112219P              0.00                    21325  050  24   12     0  8
STJ    SE 0518KM          128 49                       04  070  0000628 39ML34MN
SIC   8712112219P XC2035       0.00          B2131    C2155    030 257  77     0  0
SIC    W  0611KM 00  482 269 49              04  167 01 -245    0000628 40ML35MN
GBN   8712112219P  B2032       0.00          B2133             030 376  30     0  8
GBN    SW 0624KM 04  025 205 49              04  093            0000167 35ML30MN
GSQ   8712112219P  A203750    -0.22          B214513 B221600 027 100  35     0  0
GSQ    W  0670KM 18 -005 258 49              04  311 04  230    0000814 42ML37MN
LMN   8712112219P  A204286    -0.29          B215277 A222608 047 100  11     0  0
LMN    SW 0718KM 18 -070 226 49              04  032 18 -102    0000147 37ML30MN
KLN   8712112219P  A204547    -0.29          A215604 C223187 037 100  12     0  0
KLN    SW 0731KM 18  039 239 49              18  093 01  135    0000204 38ML32MN
HTQ   8712112219P             -0.07                  C223771 037 100  24     0  0
HTQ    W  0750KM          262 49                     01  212    0000408 41ML35MN
SCH   8712112219P  B2049       0.00          XB22045  B22385  030 137  50     0  0
SCH    NW 0751KM 04  171 313 49               00  532 04  268   0000764 43ML38MN
MNQ   8712112219P  A204528    -0.10          B220139 B223692 027 100  18     0  0
MNQ    W  0752KM 18 -216 274 49              04  203 04  091    0000419 40ML35MN
HAL   8712112219P  X2053       0.00           2204             020 273  16     0  8
HAL    SW 0774KM 00  304 214 49              04  015            0000184 35ML32MN
EBN   8712112219P  A205595    -0.22          B221347XB225957 0331000  78     0  0
EBN    W  0813KM 18  099 249 49              04  107 00  673    0000149 37ML31MN
GGN   8712112219P  B210395    -0.29          B222882           000   0    0      0  0
GGN    SW 0885KM 04  009 230 49              04  094            0000000 00ML00MN
JAQ   8712112219P  B214832    -0.07          XB234959          000   0    0      0  0
JAQ    NW 1251KM 04 -001 294 49              00  397            0000000 00ML00MN
                 Z
```