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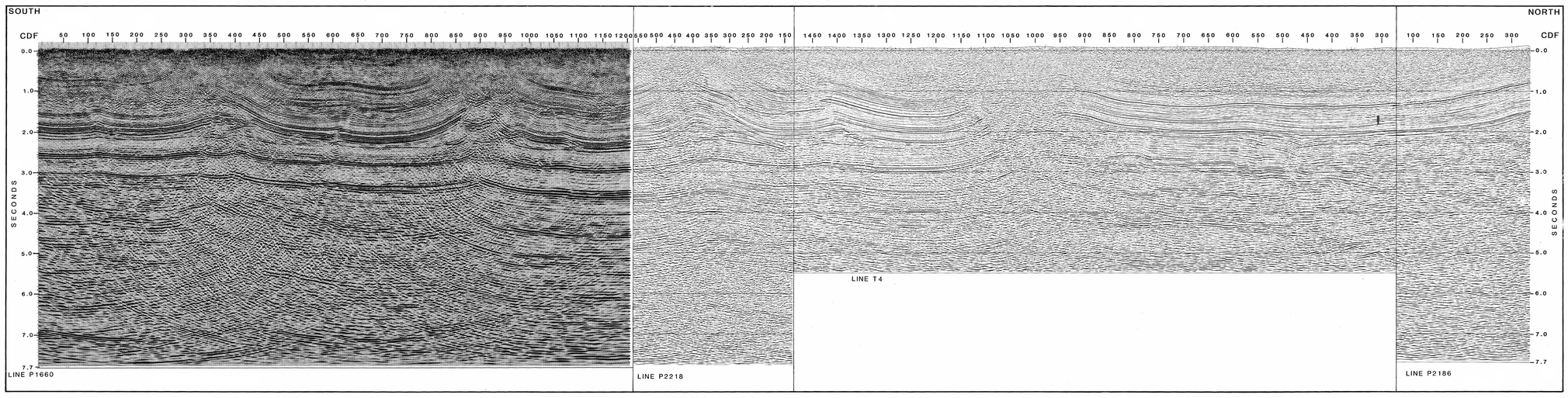
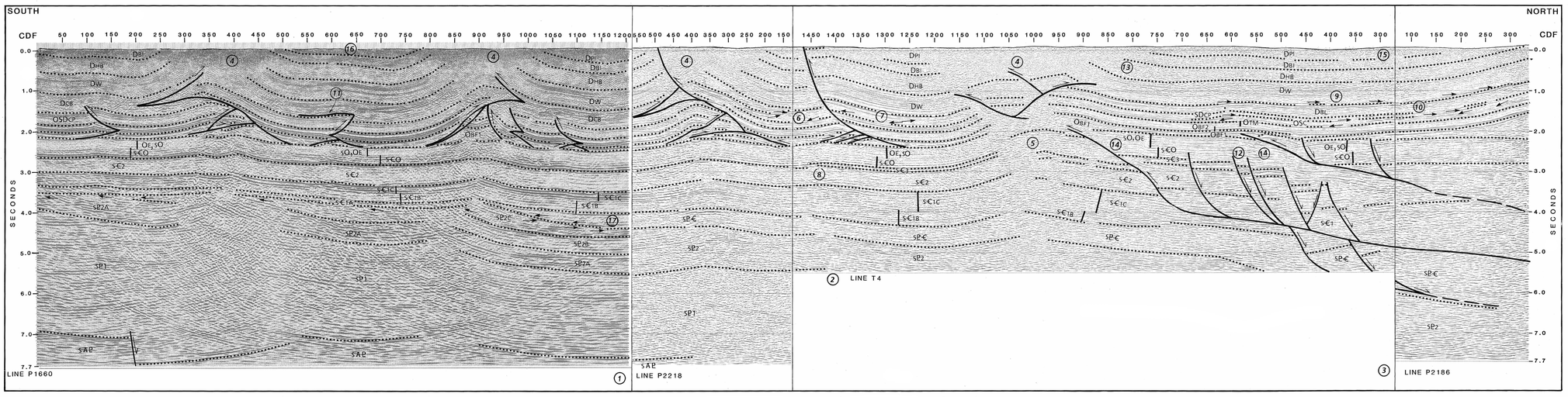
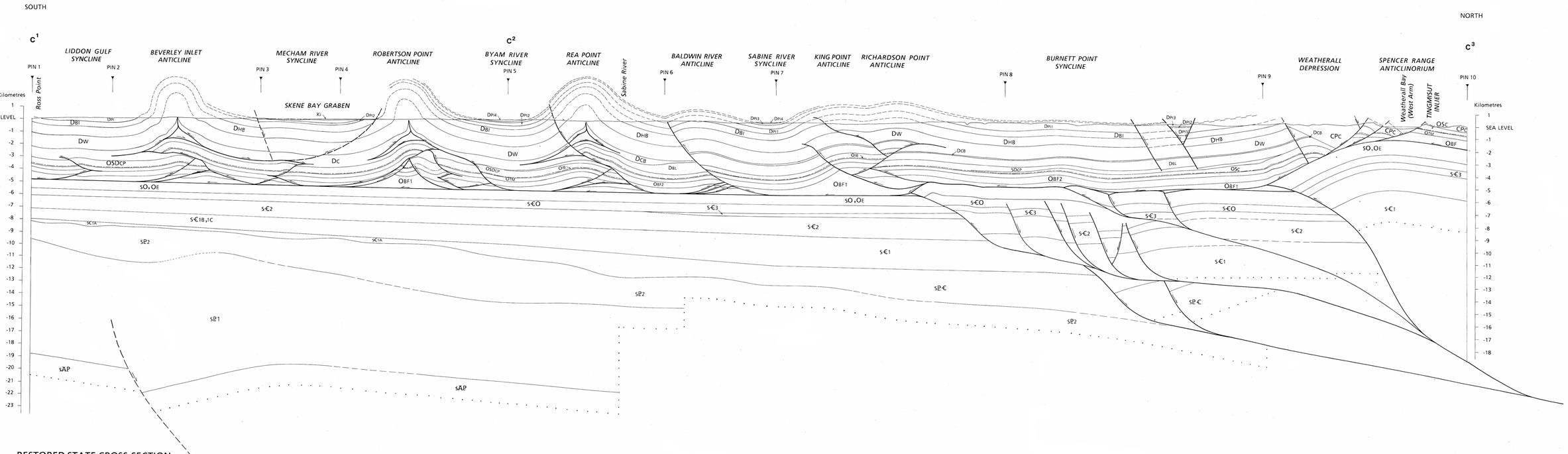
SEISMIC REFLECTION DATA



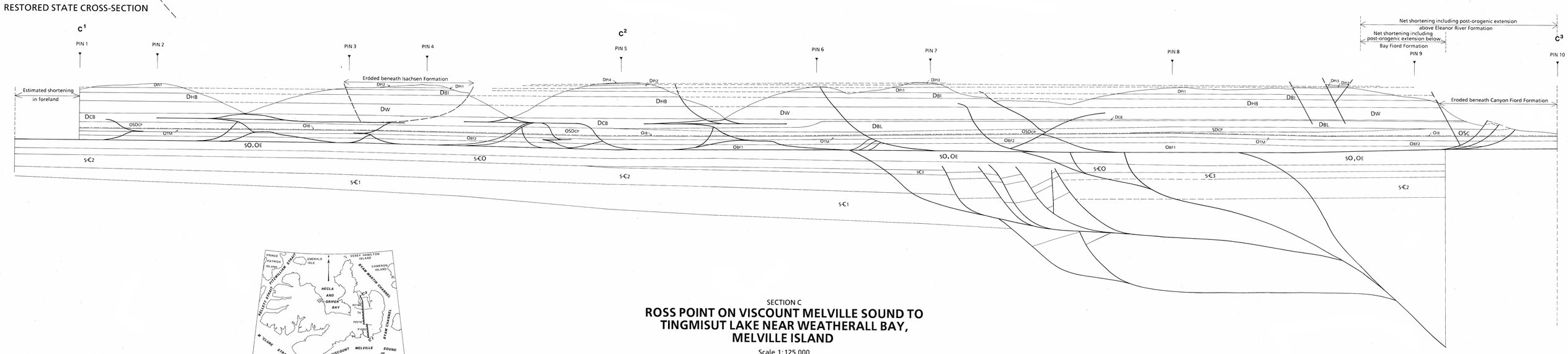
INTERPRETED SEISMIC DATA

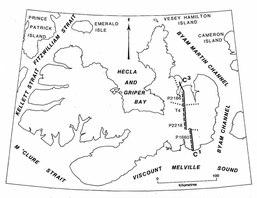


DEFORMED STATE CROSS-SECTION



RESTORED STATE CROSS-SECTION





Location of structure sections and seismic profiles

Line of structure section (with offset) .....

Seismic reflection profile (displayed) .....

Seismic reflection profile (consulted only) .....

SECTION C

ROSS POINT ON VISCOUNT MELVILLE SOUND TO TINGMISUT LAKE NEAR WEATHERALL BAY, MELVILLE ISLAND

Scale 1:125,000

Kilomètres 2 0 2 4 6 8 10 Kilometres

NOTES TO ACCOMPANY SECTION C
(Seismic lines P1660, P2218, T4 and P2186)

Acquisition and Processing

1. Lines P1660 and P2218 do not intersect. Physical splice is made at closest points of the two surveys. The splice point on P1660 (CDF 1206) is 7.3 km east and along strike from the splice point on P2218 (CDF 560). Offset of surveys has resulted in some mismatch of deep reflectors. The dark aspect of P1660 results from the variable area wiggle trace type of plot. On the other lines, the wiggle has been omitted.

2. Intersecting lines T4 and 5500 ms of P2218 have been blended after stacking and before migration. Renumbering of CDF traces was executed after blending. The blend intersection is at CDF 1410. A separately-migrated 7700 ms portion of P2218 was then physically spliced to the blended and migrated T4/P2218 line. For simplicity of display and description, the contact between surveys is drawn at the splice line.

3. Intersecting lines T4 and 5500 ms of P2186 have been blended after stacking and before migration. Renumbering of CDF traces was executed after blending. The blend intersection is at CDF 280. A separately-migrated 7700 ms portion of P2186 was then physically spliced to the blended and migrated T4/P2186 line. For simplicity of display and description, the contact between surveys is drawn at the splice line.

4. Dramatic loss of signal above 1000 ms at four locations on Section C is associated with steep to vertical bedding of near surface strata, complex near surface structure, and the tendency for wave fronts to diverge and be scattered by convex (anticlinal) reflectors.

5. As well as residual velocity pull-up and over migration hyperbolae, there is significant structural relief on seismic units below the top of the Eleanor River (O_E) everywhere north of CDF 1150, line T4.

Seismic Stratigraphic Features

6. The chaotic internal reflection configuration of the Blue Fiord (D_{BL}) beneath CDF 1475, line T4, is attributed to organic build-up of carbonates at a local basin margin. The overlying Cape De Bray Formation (D_{CB}) thickens dramatically immediately to the south, and the Blue Fiord passes laterally into a condensed interval of continuous subhorizontal reflectors of basinal association.

7. Inclined (clinoform) internal reflections, with downlapping and toplapping patterns, indicate that the Blue Fiord interval consists of progradational strata (north end of P2218, south end of T4).

8. The obvious southern limit of unit $s€_3$ on this line of section is located near 2800 ms, CDF 1425, line T4.

9. Onlapping reflections above the Blue Fiord (D_{BL}) are important evidence to indicate the existence of a sequence boundary near the base of a thin Cape De Bray Formation (not shown).

10. Downlapping reflections at three locations in unit O_{SC} (P2186 and north end of T4) are believed to be associated with sloping and progradational strata of Upper Ordovician and Silurian age. The upper reflection surface of unit O_{SC} bears onlapping reflection patterns which define a depositional sequence boundary beneath unit SD_{CP}.

Structural Features

11. The small convex reflector within the Cape De Bray (D_{CB}) interval beneath CDF 590, line P1660, could be either a mound- shaped sedimentary feature or a mesoscopic intraformational fold associated with slip on an underlying detachment surface.

12. Faults imaged on line T4 between CDF 565 and 695 appear to display growth and been active during deposition of unit $s€O$.

13. Thickening of the Hecla Bay (D_{HB}) interval south of CDF 600, line T4, could be due to either rapid lateral variations in rates of sedimentation, or tectonic thickening caused by local volume redistribution.

14. Thrust ramps in Cambro-Ordovician units ($s€_1$-$s€_3$ and $s€O$-O_E) at two locations on line T4 (CDF 500 and 800) merge upward into the detachment at the base of the lower Bay Fiord (O_{BF1}) interval.

15. Faults of unknown attitude are common at the surface above a region of reduced data quality near the T4 and P2186 splice. The correct method of interpreting and projecting these faults to depth is unknown.

16 Outliers of the Isachsen Formation (K_I) are known at the surface between CDF 540 and 740, on line P1660. The outliers are probably fault bounded. However, no corresponding faults are interpretable on the seismic data.

17. The structural relationship at 4200 to 4400 ms (CDF 1000 to 1200, line P1660) is interpreted to be one in which an angular unconformity developed above eroded unit sP_2 prior to onlap of unit $sP€$.

Depth Conversion

CP_C: 3.7 km s^{-1}
D_{PI}, D_{BI}: 3.6 km s^{-1}
D_W, D_{HB}: 4.3 km s^{-1} (south) - 4.0 km s^{-1} (north)
D_{CB}: 3.9 km s^{-1}
OSD_{CP}: 4.8 km s^{-1} (south) - 5.5 km s^{-1} (north)
O_{BL}, O_{SC}, SD_{CP}: 6.0 km s^{-1} (south) - 5.0 km s^{-1} (north)
O_{TM}, O_{BF2}: 6.4 km s^{-1}
O_{BF1}: 5.3 km s^{-1}
$sP€$-O_E: 5.7 km s^{-1}
below $sP€$: 6.2 km s^{-1}

Method of Cross-section Construction and Restoration

Bed length measurement and balancing of the contacts above O_{BF1}, O_{BF2}, O_{TM}, O_{SC} and OSD_{CP} between pairs of adjacent pin lines.

Bed length measurement and balancing of the contacts above $s€_1$, $s€_2$, $s€_3$, $s€O$, and O_E between pairs of adjacent pin lines.

Bed length measurement of the contacts above D_{HB}.

Area measurement and restoration of O_{BF1}, D_{CB}, D_W, D_{HB}, D_{BI}, and D_{PI}. This method assumes that horizontal shortening of units O_{BF1}, D_{CB}-D_{PI} is the same as that expressed by bed lengths of contacts above O_{BF1}-OSD_{CP}.

Results

Section length: 115.7 km
Post-orogenic extension: 4.2 km
Pre-extension section length: 115.7 - 4.2 km = 111.5 km

Bed length of O_{TM} (this section): 127.3 km
Shortening of O_{TM} (this section): 127.3 - 111.5 = 15.8 km (9.4%)
Estimated shortening in foreland*: 5.5 km
Total shortening of O_{TM} from foreland: 15.8 + 5.5 = 21.3 km (8.6%)

Bed length of O_E (this section): 123.1 km
Shortening of O_E (this section): 123.1 - 111.5 = 11.6 km (9.4%)
Estimated shortening in foreland*: nil
Total shortening of O_E from foreland: 11.6 km

Deformed state bed length of D_{HB}: 120.8 km
(includes 10.45 line km of pre-CP_C erosion)
Apparent shortening of D_{HB} (this section): 120.8 - 111.5 = 9.3 km (7.7%)
Estimated apparent shortening in foreland*: 1.9 km
Total apparent shortening of D_{HB} (from foreland): 9.3 + 1.9 = 11.2 km (4.7%)

Range of assumed tectonic thickening of D_W-D_{PI} (approximate): 2 - 9%

*Foreland shortening is carried over to this section along the axial trace of Liddon Gulf Syncline from pin line 2 on Section D.

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