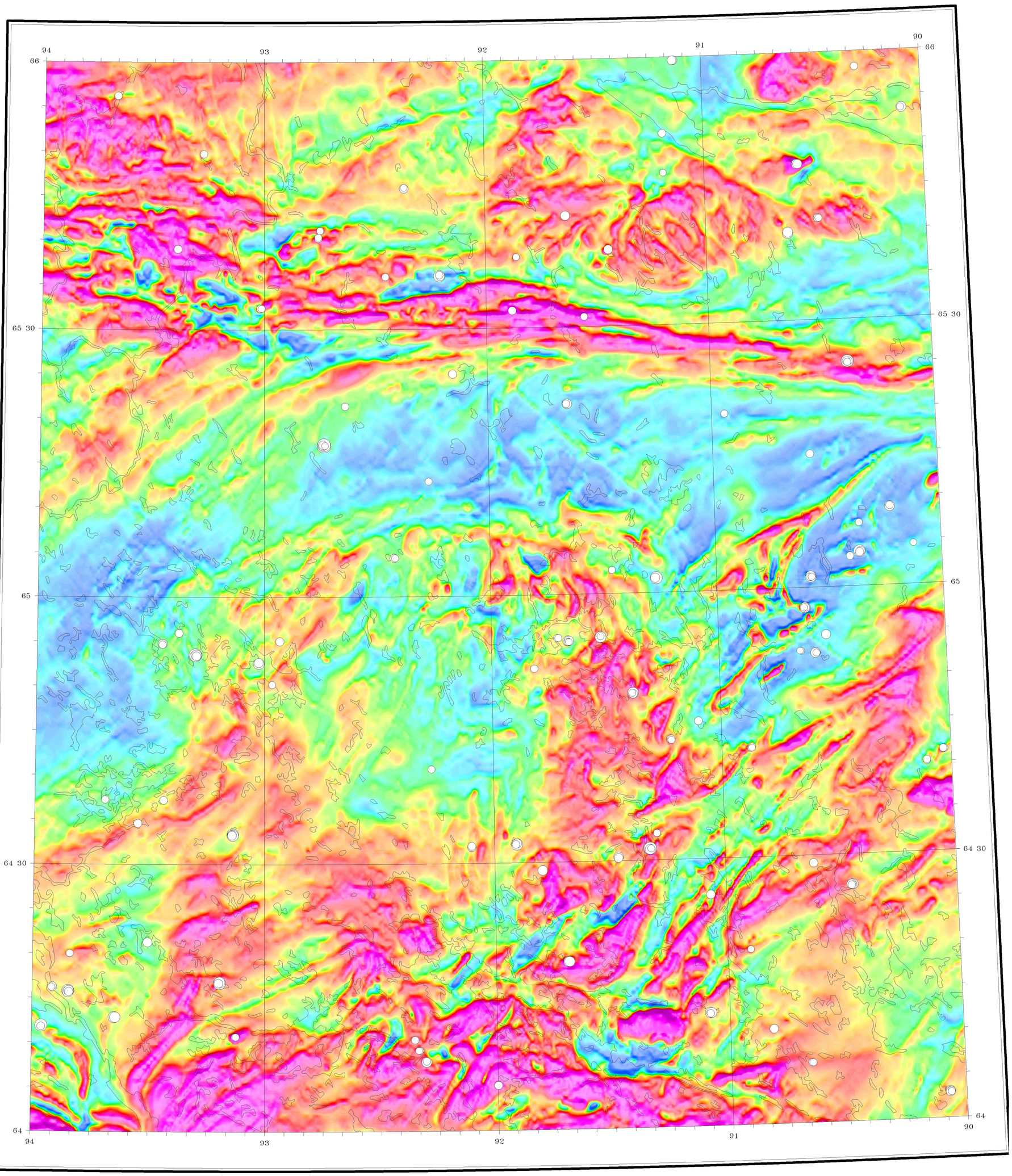
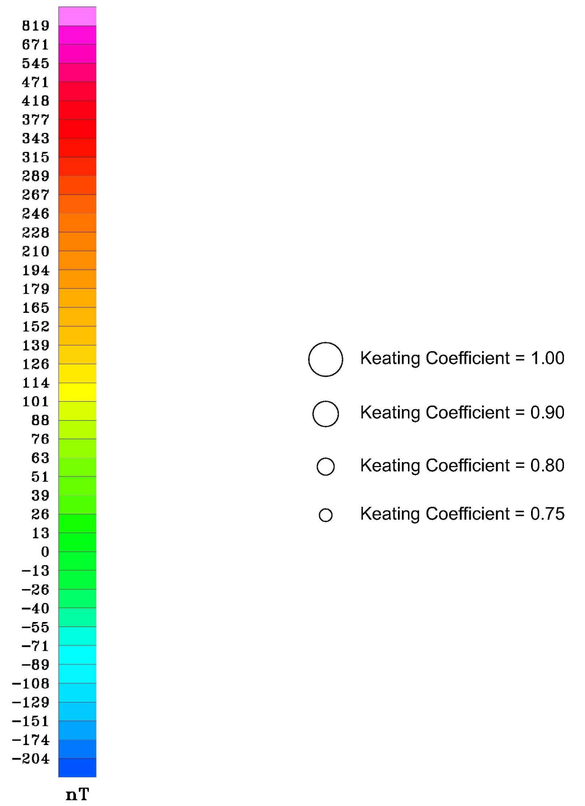


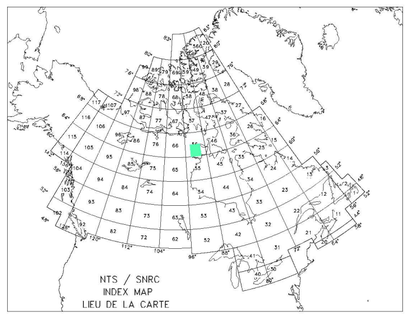


Keating Coefficient = 1.00

Keating Coefficient = 0.90

Keating Coefficient = 0.80

Keating Coefficient = 0.75



Colour Shaded Relief of the Residual Total Magnetic Field With Keating Correlation Coefficients NTS 56 BCFG, Nunavut, Canada

Scale 1:500 000/Échelle 1/500 000

0 10 20 30 40 50
kilometres kilomètres

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
CENTRAL MERIDIAN W93°

PROJECTION UNIVERSELLE TRANSVERSE DE MERCATOR
MERIDIEN CENTRAL 93°O

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Natural Resources Canada | Ressources naturelles Canada

DESCRIPTIVE NOTES

INTRODUCTION

This map represents the colour shaded relief of the residual total magnetic field. Superimposed are Keating correlation coefficients, represented by white circles, that locate circular magnetic anomalies. The radius of the circles is proportional to the degree of correlation between the located magnetic anomaly and a model anomaly representing the magnetic field expected from a kimberlite pipe.

DATA

The aeromagnetic data used in this study are from the holdings of the Canadian Aeromagnetic Data Base maintained by the Geological Survey of Canada. The data were acquired between 1970 and 1973. The surveys were flown at 305 m mean terrain clearance with a flight-line spacing of 800 m and an east-west orientation. The analogue magnetic profiles were manually levelled, transcribed to 1:50 000 scale maps and hand contoured. Digital versions of these surveys were obtained by digitizing the maps along posted flight lines at intersections with contour lines.

PROCESSING

For the purpose of this study, the flight-line data were interpolated to a regular grid with an interval of 200 m. Decorrugation, or microlevelling, was applied to reduce line-to-line levelling errors. The International Geomagnetic Reference Field (IGRF) was subtracted from the total field to produce a residual total magnetic field grid. This grid is presented with superimposed shaded relief. The shading for this image was generated using a sun illumination inclination of 60° and a declination of 180°.

KEATING CORRELATION COEFFICIENTS

Keating correlation coefficients result from a pattern recognition technique (Keating, 1995) applied to magnetic field data to identify and locate roughly circular magnetic anomalies. The technique and coefficients have a particular application in the search for kimberlite pipes. Kimberlite pipes are often associated with circular magnetic anomalies, although some produce no anomaly, and others are elongate in shape. Other geologic sources may also produce circular magnetic anomalies. Hence the results of this method do not represent a map of kimberlite locations, but rather highlight circular to quasi-circular anomalies that potentially may be associated with kimberlite pipes.

The technique consists of computing the correlation coefficient, over a moving window, between a vertical cylinder model magnetic anomaly and the gridded magnetic data. A cylinder provides a good first order approximation to the shape of a kimberlite pipe. The cylinder model parameters for this survey are as follows: diameter: 200 m, depth to top of cylinder: 10 m, depth extent: infinite, magnetic inclination: 75º N, magnetic declination: 0º W. Results with a correlation coefficient greater than 0.75 are depicted as circular symbols, scaled to reflect the correlation value. The more circular anomalies are those that exhibit a cluster of solutions.

Additional copies and the digital data used in the production of this map are available from the Geophysical Data Centre, Geological Survey of Canada, 615 Booth Street, Room 235, Ottawa, Ontario K1A 0E9. Telephone: (613) 995-5326; fax: (613) 952-8987; email: infogdc@agg.NRCan.gc.ca; WWW: http://gdcinfo.agg.NRCan.gc.ca/.

REFERENCES

Keating, P., 1995, A simple technique to identify magnetic anomalies due to kimberlite pipes, Explor. Mining Geol., v.4, no. 2, 121-125.

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