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Joint Fennoscandian magnetic anomaly map projects 1980-2003: reduction and fitting of national data sets to common base

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Since 1980 a series of joint attempts was carried out to combine Finnish, Norwegian, Swedish and Russian magnetic anomaly data across the Fennoscandian Shield (Korhonen et al 1997). The aim was to share data for regional reference in NW-Europe and make the set available for the global magnetic anomaly map that was compiled in the Working group V-9, Magnetic Anomalies, Land and Sea, in International Association of Geomagnetism and Aeronomy (IAGA).

The work was done in four parts: The Nordkalott-project 1980-1986 (Korhonen et. al. 1986); Central Finland – Karelia 1992 – 1998 (Korhonen et al. 2001a): North Finland – Kola 1996 – 2001 (Korhonen et al. 2001b); Geological and geophysical maps of the Fennoscandian shield 1997 – 2002 (Korhonen et al. 2001).

All data sets consisted of 1 km resolution grids of magnetic total intensity anomalies reduced to 1965.0 by base stations and geomagnetic observatories of the Northwest Europe. In general the anomalies fitted well with each other. Grid level knitting, normally less than 50 nT was applied at the borders.

Finland: Flux-gate measurements (1951-1972) tied with long profiles (40 km apart, 1968-1969) to absolute total field 1965.0. Reduction formulas were similar as given

by Korhonen (2005).

Norway: Flux gate and total field measurements to get absolute total field 1965.0.

Sweden: Total field surveys that were tied by long profiles (17 km apart, 1998) to absolute total field 1965.0. Reduction procedure of profiles was based on base station network and moving base stations (Korhonen and Schwarz 2001).

Russia: Various types of magnetic surveys compiled by Sokol (1975) in reference to a Russian anomaly field in a scale of 1:500 000, and further digitized. Long wavelengths were reduced to respond DGRF65 anomalies by two long profiles in 1999. The data was tied with Finnish anomalies by a Finnish profile along the border line between Russia and Finland, measured in 1993.

Comparison of these data and adjoining Estonian data in the Fennoscandian magnetic anomaly map resulted to correlation coefficient of 0.34 with MF5 (Maus et all 2007) at elevation of 5 km above the terrain. For upward continued fields the correlation coefficient is 0.64 at elevation of 60 km, and 0.60 at 225 km. Like Australian (Milligan and Franklin 2004) and West-Russian (Litvinova et all 2005) sets the Fennoscadian magnetic anomaly grid belongs to the most correlative sets used for compilation of World Digital Magnetic Anomaly Map, WDMAM2007 (Korhonen et al 2007). Hence it may be used as reference material to see how well the anomaly levels of near ground data can be determined when compared with satellite data.

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