MPM DEMO DATA SET METADATA

This document briefly describes the data sets and data sources in the MPM demo data packages. Further information is available in links given where available. All data is free but licenced by GTK (see terms of use in Appendix)

Data package includes geological, geophysical and geochemical data sets and derivatives calculated from these. Original geological and geochemical data is given both in vector and raster format, geophysical data as raster format. The derivatives calculated from these are all in raster format. Data package is in ESRI File geodatabase format accompanied with ArcMap document file (.mxd).

Geological data

The geological data is extracted from GTK's digital bedrock map of Finland (Bedrock of Finland - DigiKP). Mineral deposit data is derived from GTK's "Mineral deposits of Finland" data base. Four mineral deposit-type layers are also extracted from the mineral deposits data according to their genetic type. These are "Orogenic_Au, IOCG (Iron oxide-copper-gold), Magmatic_PGE and Magmatic_NiCu layers. These were generated for use either as training sites or validation points. For each of the different data sets a Fuzzy Membership Value column was added. Fuzzy Membership values were estimated based on each deposits metal content and/or economical potential.

Geological data layer names and explanations are given in Table 1.

Table 1. Geological data layers in MPM demo data package

Layer name	Explanation
mineral_deposits	metallic deposits and occurrences of the area
bedrock200k	lithological units as polygons
bedrock200k_line	lithological units as polylines
blackshale200k	black shales/schists as polylines
struct200k	shear, fault and thrust zones as polylines
domli	geological domain boundaries as polylines
lithoname200k	lithological units classified by lithology in raster format
rockclass200k	lithological units classified by type in raster format
group_200k	supracrustal rocks classified by lithostratigraphic groups in raster format
era_200k	lithology classified by era in raster format

Geochemical data

The geochemical data consist of GTK's regional till data set. Regional till geochemistry describes the distribution of 25 elements in basal till. The sampled material was chemically unchanged C-horizon till preferably under the water table. The average sampling depth was approximately 1.5-2 m. Sampling was done during years 1983-1991. The sampling density was one sample per 4 km^2. The samples were collected as composite of 3-5 subsamples. The coordinates of each sample are calculated based on coordinates of these 3-5 subsamples. Part of the subsamples are originally from targeting till geochemical sampling. From dried samples the <0.06 mm fraction was sieved for analysis. From hot aqua regia assay abundances of 25 elements were determined (e.g. Salminen 1995).

The demo data set consist of original regional till data as point sets (Geochem_1 and Geochem_2). Raster sets were interpolated from these for 15 elements using inverse distance method. The geochemical rasters are named “till_cg_” followed by respective element abbreviation.

Geophysical data

The geophysical data consist of GTK’s low-altitude aerogeophysical data collected during 1972-2007. The parameters for original data were: flight altitude 30-40 m, the nominal flight line spacing 200 m and sample distance along the survey line 6-50 m. The MPM demo data set includes total magnetic field, apparent resistivity, quadrature (em-imaginary) and in-phase (em-real) components. The dataset has been recalculated for 500 m x 500 m cell size grids.

Layer gravity_worms represent maximas of spatial gravity gradients at different upward continuation levels. The processing technique, multiscale edge detection, was first presented by Hornby et al. (1999) and later discussed by Archibald et al. (1999) and Holden et al. (2000). The regional Bouguer data (1 observation per 25 km^2) used in the processing was provided by National Land Survey of Finland.

Derivatives and reclassified data

The data set included following derivative maps calculated from geological data: dns_stru200k (density of structures), dst_domli (distance to domain boundaries), dst_stru200k (distance to structures), dstblackshale (distance to black shales), litho200klind (lithological contact density) dst_worms (distance to gravity worms), and dns_worms (density of gravity worms).

For demonstration purposes set of reclassified data sets are included in the package (named using prefix rc_ and followed by respective data set name). These were done using ArcGIS Spatial analyst Fuzzy Membership tool.

References and links:

Airo M.-L. (*ed.*) 2005. Aerogeophysics in Finland 1972-2004: Methods, System Characteristics and Applications. Geological Survey of Finland Special Paper 39. 197 p. 8 app.

Archibald, N., P. Gow, and F. Boschetti, 1999, Multiscale edge analysis of potential field data. Exploration Geophysics, 30, 38–44.

Bedrock of Finland – DigiKP. Digital map database [Electronic resource]. Geological survey of Finland [referred 15.6. 2016].
http://tupa.gtk.fi/paikkatieto/meta/bedrock_of_finland_200k.html

GTK Regional till database: http://hakku.gtk.fi/en/locations/search

Holden, D., N. Archibald, F. Boschetti, and M. Jessell, 2000, Inferring geological structures using wavelet-based multiscale edge analysis and forward models. Exploration Geophysics, 31, 617–621.

Hornby, P., F. Boschetti, and F. G. Horowitz, 1999, Analysis of potential field data in the wavelet domain. Geophysical Journal International, 137, 175–196.

METSO – GTK Mineral deposit database of Finland [Electronic resource]. Geological survey of Finland [referred 15.6. 2016] http://hakku.gtk.fi/en/locations/search?action=search&controller=locations&locale=fi&location_id=62

Salminen R. (*ed.*) 1995. Alueellinen geokemiallinen kartoitus Suomessa vuosina 1982-1994. Summary: Regional Geochemical Mapping in Finland in 1982-1994. Geological Survey of Finland Raport of Investigation 130. 47 p. 24 app. (*In Finnish, summary in English*).