GTK AEROGEOPHYSICAL SURVEY DESCRIPTION

The survey includes three survey methods:

- Magnetic total field measurements
- Electromagnetic measurements
- Radiometric gamma-ray measurements

The detailed description of survey equipment systems is proposed in appendix 1. The files were compressed to zip –files (ZipGenius6) so that each zip –file represent one flight area. The index map is presented in appendix 2. The content of appendix 2 is represented as ArcGis shape –file where the data attributes are as follow:

AREA	Name of flight area
YEAR	Flight year
AIRCRAFT	Aircraft (KOG = Twin Otter, VKB = DC-3, USI = Cessna Caravan)
DIRECTION	Flight direction
SPACING	Flight line spacing
NUMBER	Number of magnetometers
TYPE	Type of magnetometer (C = cesium, P = proton)
FREQUENCY	Number of AEM frequencies

GTK DATA FORMAT DESCRIPTION

XYZ Files

There is one Geosoft XYZ file corresponding to each survey method (magnetic, radiometric and electromagnetic measurements). Original coordinate system based on Gauss-Krueger projection and central meridian of 21^{o}E for zone 2 map sheets (KKJ2), 27^{o}E for zone 3 map sheets (KKJ3) and 30^{o}E for zone 4 map sheets (KKJ4).

Electromagnetic coil configuration was changed in 1980 from vertical coaxial to vertical coplanar. In vertical coaxial coil configuration system conductors are located as negative values and on the contrary as positive values in vertical coplanar system.

Apparent resistivity and depth was calculated from primary EM components by a half-space model.

The files are named as follows (# means the first three letters of the area name):

AP#.XYZ	apparent resistivity data
EM#.XYZ	electromagnetic data
MB#.XYZ	back boom magnetometer data (1984-1988, Twin Otter; 1999-2006, Cessna)
ML#.XYZ	left wingtip magnetometer data
MR#.XYZ	right wingtip magnetometer data (1974-2005)
MN#.XYZ	nose boom magnetometer (2006-2008, Twin Otter)
RA#.XYZ	radiometric data

XYZ File Columns

Each row in these ASCII files corresponds to one measurement point. One column of the row corresponds to one measurement parameter.
The data includes the following columns:

Electromagnetic data files from the year of 1974 to 1995.

X, Y	Easting, northing (meters)
RE	In-phase component 3 kHz (ppm)

IM	Quadrature component 3 kHz (ppm)
RALT	Radar altitude (meters)

Apparent resistivity data from the year of 1974 to 1995

X, Y	Easting, northing (meters)
LFA	Apparent resistivity 3 kHz (Ohm-m)
LFS	Apparent depth to conductor (m)

Electromagnetic data files from the year of 1996 to 2005

X, Y	Easting, northing (meters)
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
LFR/RE3	In-phase component of the lower frequency 3 kHz (ppm)
LFI/IM3	Quadrature component of the lower frequency 3 kHz (ppm)
HFR/RE14	In-phase component of the higher frequency 14 kHz (ppm)
HFI/IM14	Quadrature component of the higher frequency 14 kHz (ppm)

Apparent resistivity data from the year of 1996 to 2005

X, Y	Easting, northing (meters)
LFA/AR3	Apparent resistivity, 3 kHz (Ohm-m)
LFS/AD3	Apparent depth to conductor, 3 kHz (m)
HFA/AR14	Apparent resistivity, 14 kHz (Ohm-m)
HFS/AD14	Apparent depth to conductor, 14 kHz (m)

Electromagnetic data files from the year of 2006

X, Y	Easting, northing (meters)
FLIGHT	Flight material number
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
GPS_H	GPS altitude above WGS84 ellipsoid (meters)
DTM	Digital terrain model (above WGS-84 ellipsoid)
SPHER	Spherics monitor
PLM	Power line monitor (on linear range 0 – 999)
RE09	In-phase component, 0.9 kHz (ppm)
IM09	Quadrature component, 0.9 kHz (ppm)
RE3	In-phase component, 3 kHz (ppm)
IM3	Quadrature component, 3 kHz (ppm)
RE12	In-phase component, 12 kHz (ppm)
IM12	Quadrature component, 12 kHz (ppm)
RE25	In-phase component, 25 kHz (ppm)
IM25	Quadrature component, 25 kHz (ppm)

Electromagnetic data files from the year of 2007 to 2008

X, Y	Easting, northing (meters)
Z	GPS altitude above WGS84 ellipsoid (meters)
PITCH	Rotation around the side-to-side axis (degrees)
ROLL	Rotation around the front-to-back axis (degrees)

HEADING	Rotation around the vertical axis (degrees)
FLIGHT	Flight material number
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
LALT	Laser altitude (meters)
DTM	Digital terrain model (above WGS-84 ellipsoid)
PLM	Power line monitor (on linear range 0 – 999)
RE09	In-phase component, 0.9 kHz (ppm)
IM09	Quadrature component, 0.9 kHz (ppm)
RE3	In-phase component, 3 kHz (ppm)
IM3	Quadrature component, 3 kHz (ppm)
RE12	In-phase component, 12 kHz (ppm)
IM12	Quadrature component, 12 kHz (ppm)
RE25	In-phase component, 25 kHz (ppm)
IM25	Quadrature component, 25 kHz (ppm)

Apparent resistivity data from the year of 2006 to 2008

X, Y	Easting, northing (meters)
AR09	Apparent resistivity, 0.9 kHz (Ohm-m)
AD09	Apparent depth to conductor, 0.9 kHz (meters)
AR3	Apparent resistivity, 3 kHz (Ohm-m)
AD3	Apparent depth to conductor, 3 kHz (meters)
AR12	Apparent resistivity, 12 kHz (Ohm-m)
AD12	Apparent depth to conductor, 12 kHz (meters)
AR25	Apparent resistivity, 25 kHz (Ohm-m)
AD25	Apparent depth to conductor, 25 kHz (meters)

Magnetic data from the year of 1974 to 1995 are in the following order

X, Y	Easting, northing (meters)
MAG	Total magnetic field at IGRF65 level (nT)
RALT	Radar altitude (meters)
BALT	Barometric altitude (meters)

Magnetic data files from the year of 1996 to 2006

X, Y	Easting, northing (meters)
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
MGCL	Total magnetic field of the left wingtip magnetometer at IGRF65 level (nT)
MGCR	Total magnetic field of the right wingtip magnetometer at IGRF65 level (nT)
MGCN	Total magnetic field of the nose boom magnetometer at IGRF65 level (nT)

Magnetic data files from the year of 2007 to 2008

X, Y	Easting, northing (meters)
Z	GPS altitude above WGS84 ellipsoid (meters)
PITCH	Rotation around the side-to-side axis (degrees)
ROLL	Rotation around the front-to-back axis (degrees)
HEADING	Rotation around the vertical axis (degrees)
DAY	Day number from the beginning of the year

TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
LALT	Laser altitude (meters)
DTM	Digital terrain model (above WGS-84 ellipsoid) (meters)
MGCL	Total magnetic field of the left wingtip magnetometer at IGRF65 level (nT)
MGCN	Total magnetic field of the nose boom magnetometer at IGRF65 level (nT)
BASE	Ground station correction (nT)

Radiometric data files from the year of 1974 to 1995

X, Y	Easting, northing (meters)
TOT	Total radiation (ur –unit)
KAL	Potassium concentration (% K)
URA	Uranium concentration (ppm equivalent uranium eU)
THO	Thorium concentration (ppm equivalent thorium eTh)
RALT	Radar altitude (meters)

Radiometric data files from the year of 1996 to 2005(Twin Otter), 1999 to 2006 (Cessna)

X, Y	Easting, northing (meters)
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
BALT	Barometric altitude (meters)
TOUT	Temperature outside the aircraft (°C)
TOT	Total radiation (ur –unit)
KAL	Potassium concentration (% K)
URA	Uranium concentration (ppm equivalent uranium eU)
THO	Thorium concentration (ppm equivalent thorium eTh)

Radiometric data files from the year of 2006(Twin Otter)

X, Y	Easting, northing (meters)
FLIGHT	Flight material number
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
BALT	Barometric altitude (meters)
TOUT	Temperature outside the aircraft (°C)
GPS_H	GPS altitude above WGS84 ellipsoid (meters)
DTM	Digital terrain model (above WGS-84 ellipsoid) (meters)
TOT	Total radiation (ur –unit)
KAL	Potassium concentration (% K)
URA	Uranium concentration (ppm equivalent uranium eU)
THO	Thorium concentration (ppm equivalent thorium eTh)

Radiometric data files from the year of 2007 to 2008

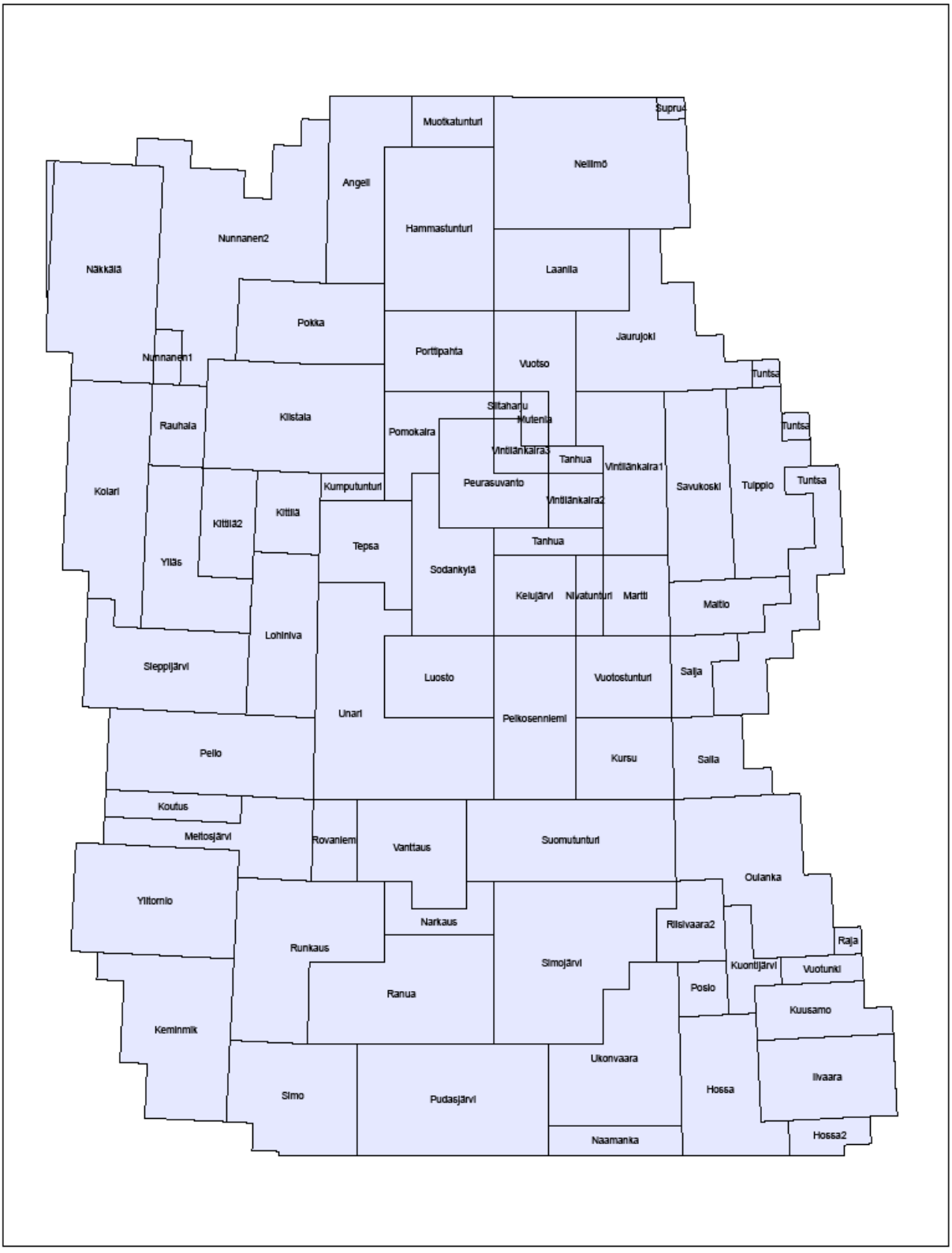
X, Y	Easting, northing (meters)
Z	GPS altitude above WGS84 ellipsoid (meters)
PITCH	Rotation around the side-to-side axis (degrees)

ROLL	Rotation around the front-to-back axis (degrees)
HEADING	Rotation around the vertical axis (degrees)
FLIGHT	Flight material number
DAY	Day number from the beginning of the year
TIME	Measurement time stamp (hhmmss)
DIR	Flight direction (degrees, clockwise from north)
RALT	Radar altitude (meters)
LALT	Laser altitude (meters)
BALT	Barometric altitude (meters)
TOUT	Temperature outside the aircraft (°C)
DTM	Digital terrain model (above WGS-84 ellipsoid) (meters)
TOT	Total radiation (ur –unit)
KAL	Potassium concentration (% K)
URA	Uranium concentration (ppm equivalent uranium eU)
THO	Thorium concentration (ppm equivalent thorium eTh)

Aircraft: OH-KOG	Magnetometers Magnetometrit			Electromagnetics Sähkömagneettinen				Radiometrics Radiometrinen	
Year Vuosi	Sensors / Anturit P=Proton/C=Cesium		Registration Tallennusväli	Coil distance Kelaväli	Frequency Taajuus	Moment Momentti	Registration Tallennusväli	Crystal volume Kidetilavuus	Channels Kanavia
	N:o	C/P	(1/s)	(m)	(Hz)	(Am*2)	(1/s)	(l)	N:o
1973	1	P	2	26,5	3220	127	2	27,3	36
1974	1	P	2	26,5	3220	127	2	27,3	36
1975	2	P	2	25,8	3220	127	2	27,3	36
1976	2	P	2	25,8	3220	127	2	27,3	36
1977	2	P	2	25,8	3220	127	2	27,3	36
1978	2	P	2	25,0	3220	127	2	27,3	54
1979	2	P	2	25,0	3220	127	2	27,3	54
1980	2	P	2	21,44	3222	105	4	25,0	120
1981	2	P	2	21,36	3113	105	4	25,0	120
1982	2	P	2	21,36	3113	105	4	25,0	120
1983	2	P	2	21,36	3113	105	4	25,0	120
1984	3	P	4	21,36	3113	105	4	25,0	120
1985	3	P	4	21,36	3113	105	4	25,0	120
1986	3	P	4	21,36	3113	105	4	25,0	120
1987	3	P	4	21,36	3113	105	4	25,0	120
1988	3	P	4	21,36	3113	105	4	25,0	120
1989	2	P	4	21,36	3113	105	4	25,0	120
1990	2	P	4	21,36	3113	105	4	25,0	120
1991	2	P	4	21,36	3113	105	4	25,0	120
1992	2	C	4	21,36	3113	105	4	25,0	120
1993	2	C	4	21,36	3113	105	4	25,0	120
1994	2	C	4	21,36	3113	105	4	25,0	120
1995	2	C	4	21,36	3113	105	4	25,0	120
1996	2	C	4	21,36	3125/14368	115/55	4/4	25,0	120
1997	2	C	8	21,36	3125/14368	115/55	4/4	41 (33+8)	256
1998	2	C	8	21,36	3125/14368	115/55	4/4	41 (33+8)	256
1999	2	C	10/8	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2000	2	C	10/8	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2001	2	C	10	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2002	2	C	10	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2003	2	C	10	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2004	2	C	10	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2005	2	C	10	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2005	2	C	10	21,36	3125/14368	115/55	4/4	41 (33+8)	256
2006	2	C	10	21,36	912/3005/11962/24510	115/55	4/4	41 (33+8)	256
2007	2	C	10	21,36	912/3005/11962/24510	115/55	4/4	41 (33+8)	256

Aircraft: OH-USI	Magnetometers Magnetometrit			Electromagnetics Sähkömagneettinen				Radiometrics Radiometrinen	
Year Vuosi	Sensors / Anturit C=Cesium		Registration Tallennusväli	Coil distance Kelaväli	Frequency Taajuus	Moment Momentti	Registration Tallennusväli	Crystal volume Kidetilavuus	Channels Kanavia
	N:o		(1/s)	(m)	(Hz)	(Am*2)	(1/s)	(l)	N:o
2000-2007	1	C	10	16,96	3005/14368	50/18	4/4	41 (33+8)	256

Paikannus		Positioning
1973-1975	kiintopisteet	camera fixpoints
1976-1992	kiintopisteet+doppler	camera fixpoints+doppler
1993-	differentiaali GPS	differential GPS


Supru4
Muotkatunturi
Nellimö
Angeli
Nunnanen2
Hammastunturi
Näkkälä
Laanila
Pokka
Jaurujoki
Porttipahta
Nunnanen1
Vuotso
Tuntsa
Siitaharju
Rauhala
Kilpisjärvi
Mutenia
Tuntsa
Pomokaira
Vintiänkaira3
Tanhua
Vintiänkaira1
Kolari
Kumputunturi
Peurasuvanto
Savukoski
Tulppio
Tuntsa
Vintiänkaira2
Kittilä2
Kittilä
Tepsa
Tanhua
Ylläs
Sodankylä
Kelujärvi
Nivatunturi
Martti
Maltio
Lohiniva
Sieppijärvi
Luosto
Vuotostunturi
Salla
Unari
Pelkosenniemi
Pello
Kursu
Salla
Koutus
Rovaniemi
Vanttaus
Suomutunturi
Oulanka
Ylitornio
Narkaus
Riisivaara2
Raja
Runkaus
Simojärvi
Kuontijärvi
Vuotunki
Ranua
Posio
Kuusamo
Keminmlk
Ukonvaara
Ilvaara
Simo
Pudasjärvi
Hossa
Naamanka
Hossa2