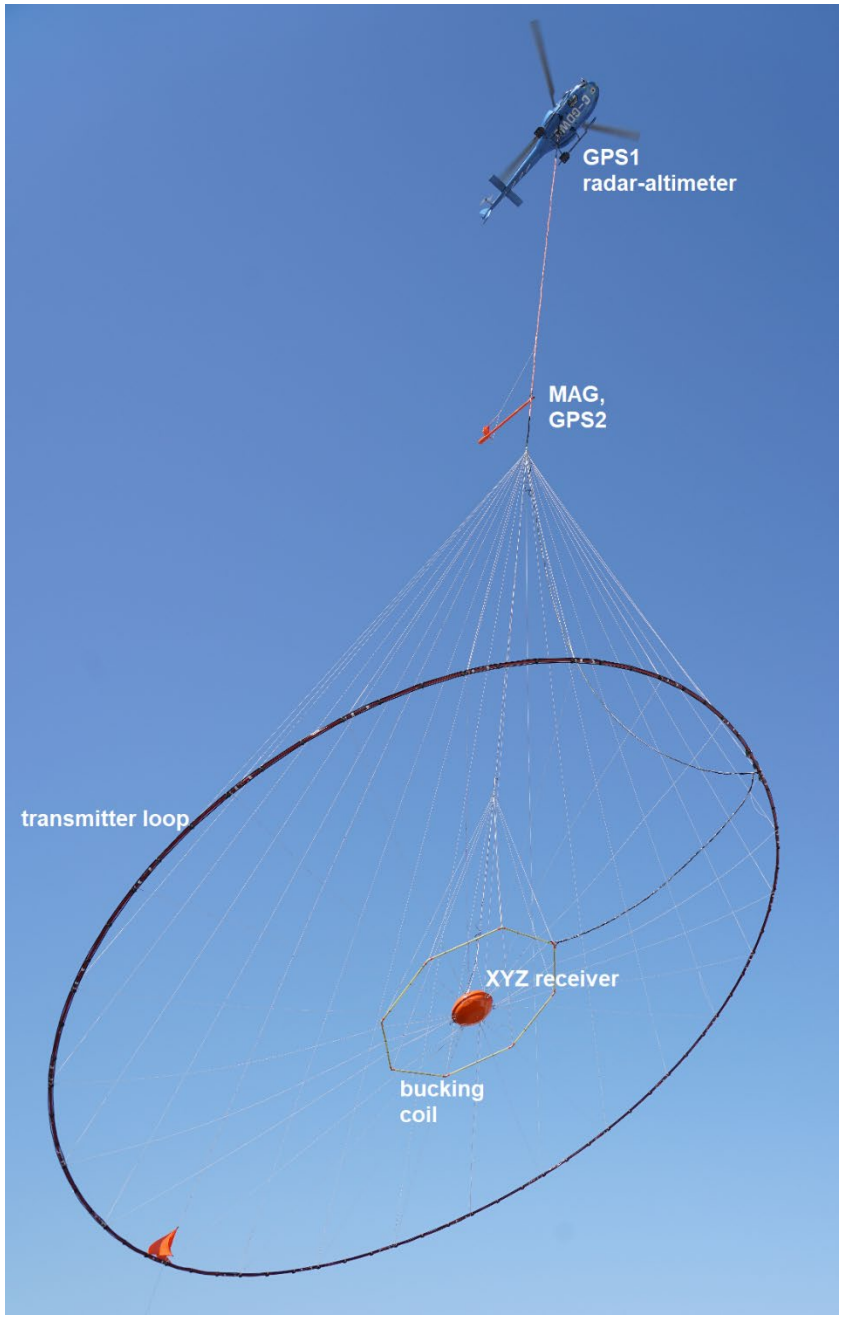
EXPERT GEOPHYSICS

from innovations to discoveries

TargetEM airborne system

Expert Geophysics Limited

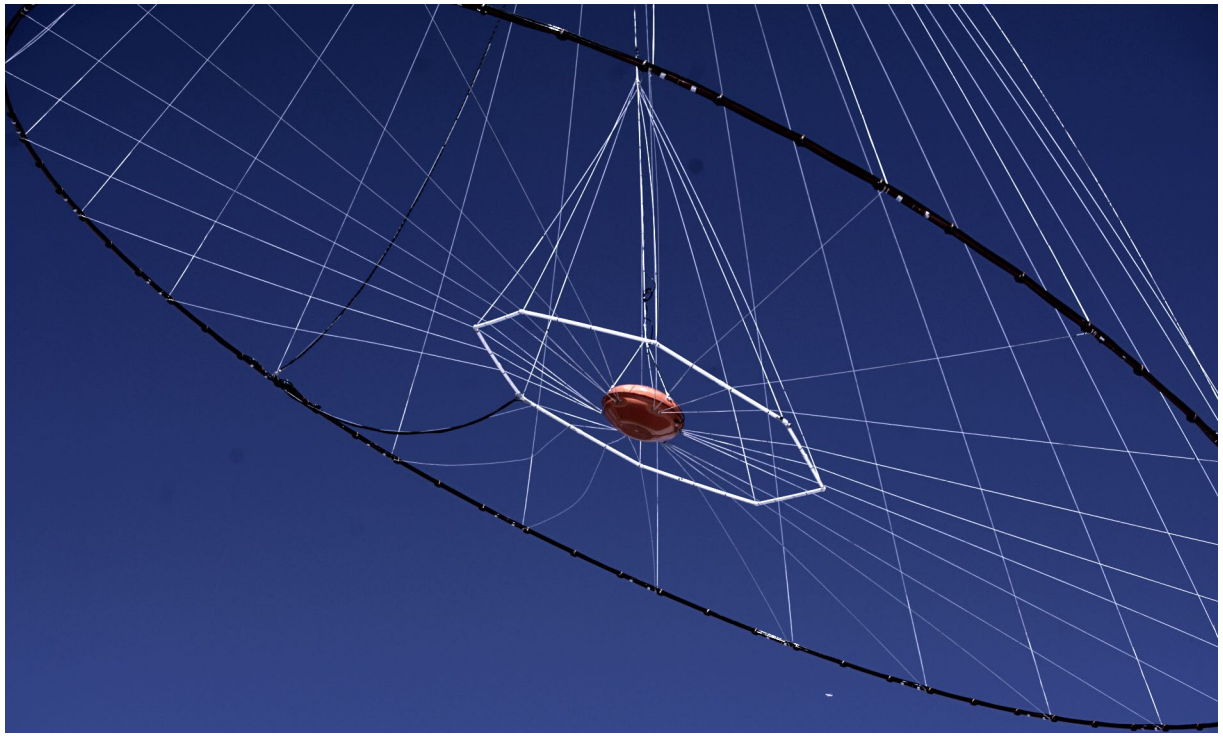
Technical specifications

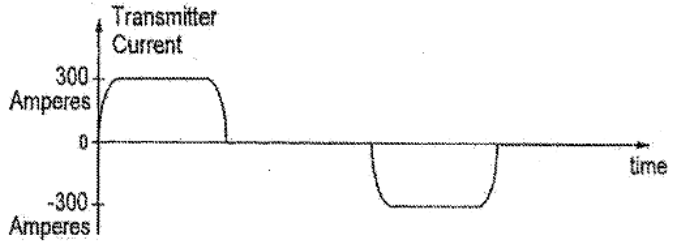


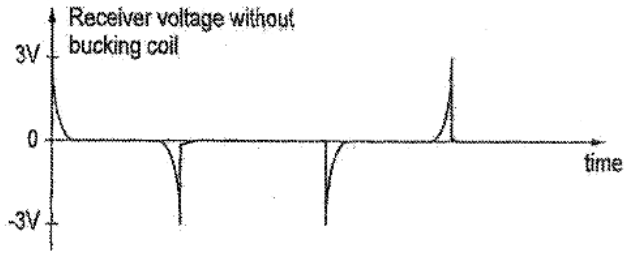
Transmitter loop diameter: 21 – 31 m
Number of turns: 4 - 6
Peak transmitter current – 230-240 A
Dipole moment – 320,000 – 700,000 NIA
Transmitter pulse shape – rectangular
Transmitter pulse width – selectable, typical 6 ms
Turn-off time – typical 1 msec
Base frequency – 25/30 Hz

Receiver – 3 orthogonal coils (X, Y and Z)
Number of turns – 120
Z coil diameter – 1 m
Full waveform recording at digitizing rate 73,728 Hz
Very high signal-to-noise ratio
Two formats of time-domain EM data output: - raw streaming data; stacked and processed data

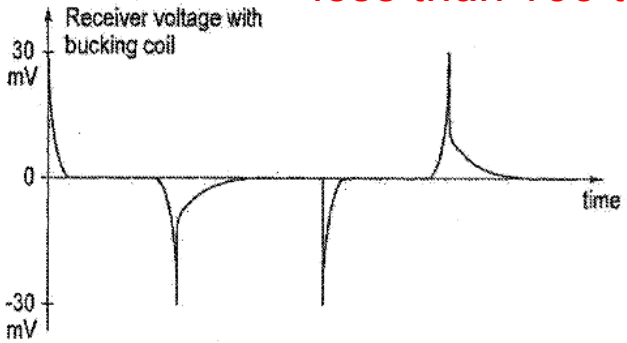
Bucking coil



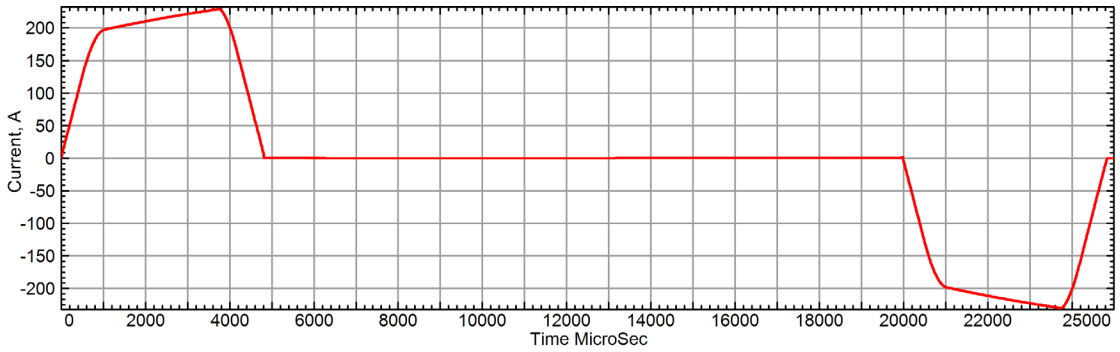


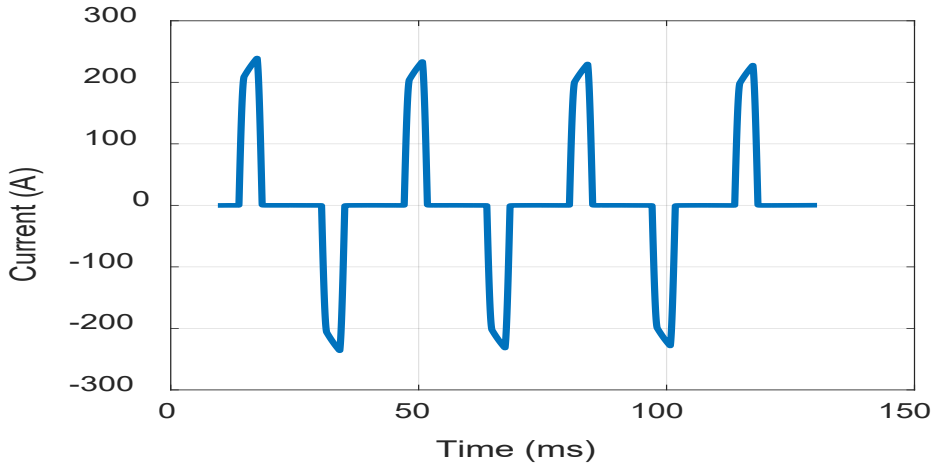


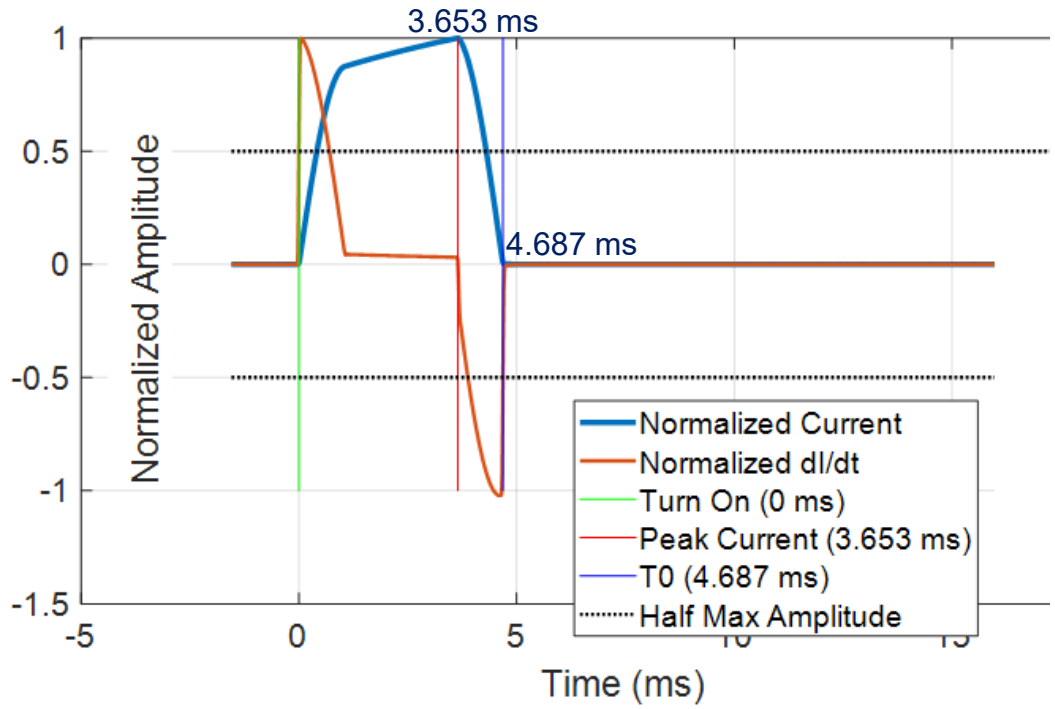
less than 100 times



Transmitter pulse waveform and off-time







Off-times table (microsec from "0" time)

[0]	[1]	[2]	[3]	[4]	[5]
		54.9	69.2	83.4	97.7
[6]	[7]	[8]	[9]	[10]	[11]
112.8	128.9	149.2	169.5	195.3	223.8
[12]	[13]	[14]	[15]	[16]	[17]
257.7	295.7	339.1	390.6	447.6	514.1
[18]	[19]	[20]	[21]	[22]	[23]
590.0	678.2	779.9	895.2	1028.1	1180.0
[24]	[25]	[26]	[27]	[28]	[29]
1356.3	1558.4	1790.4	2056.2	2360.0	2712.7
[30]	[31]	[32]	[33]	[34]	[35]
3119.6	3580.7	4123.3	4774.3	5425.3	6239.1
[36]	[37]	[38]	[39]	[40]	[41]
7161.5	8246.5	9548.6			

Acquisition system and auxiliary equipment

EGL Navigation Computer, Moving-map Display

Pilot Steering Indicator and Radio Altimeter Indicator

Powerline Monitor

Video recording on request

Radar-Altimeter

A Smartmicro model UMRR-0A radar altimeter system records the ground clearance to an accuracy of 3% over a range of 0 ft to 1,640 ft (0 to 500 m). The altimeter is interfaced to the navigation system and the data acquisition system with an output repetition rate of 10 Hz and digitally recorded.

The Airborne GPS Navigation System

EGL uses a proprietary GPS navigation system, utilizing the GPS Receiver with Linux RXM-GNSS-TM GPS engines. The key features of the GPS Receiver are:

- L1 1575.42MHz, C/A code
- 33-channel satellite tracking
- Position accuracy: 2.5 m
- Update rate: 10 Hz
- Constellation System Support:
  - GPS
  - GLONASS
  - GALILEO
  - QZSS
- DGPS support:
  - (SBAS) Satellite-Based Augmentation System
  - (RTCM) Radio Technical Commission for Maritime Services
  - (WAAS) Wide-Area Augmentation System
  - (EGNOS) European Geo-Stationary Navigation System
  - (MSAS) MTSAT Satellite-Based Augmentation System

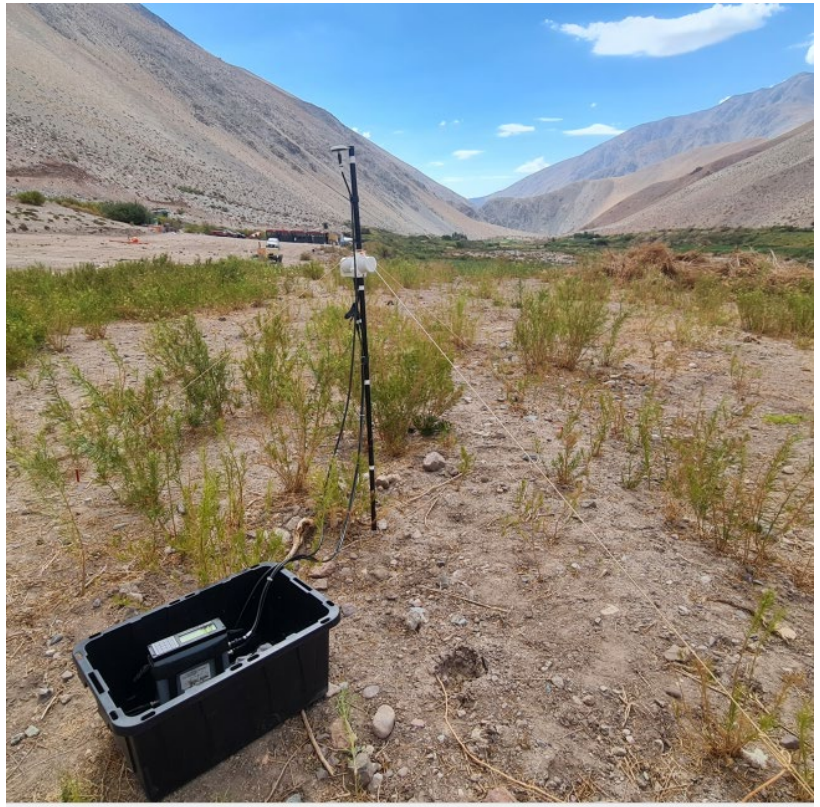
(GAGAN) GPS-Aided Geo-Augmented Navigation

The Airborne Magnetometer System

The airborne magnetometer is a state-of-the-art system developed by EGL. It utilizes a Geometrics G822A cesium magnetometer sensor, installed in its own towed-bird, in conjunction with a high-accuracy Larmor frequency counter.

Magnetometer base station

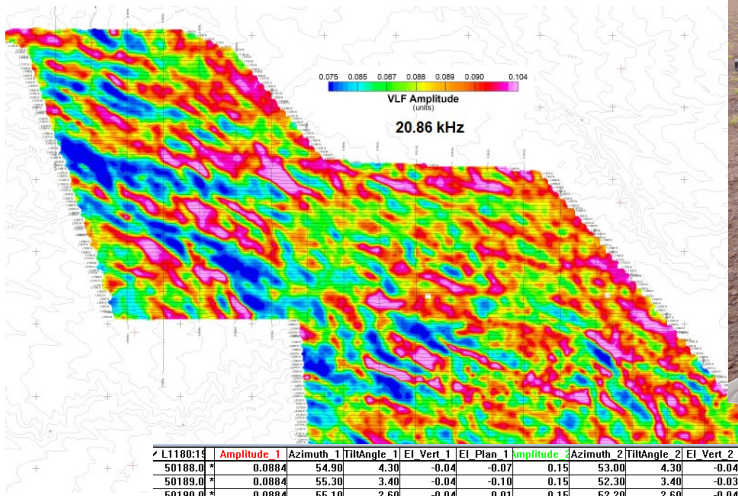
The Magnetometer Base Station (GSM-19 Overhauser magnetometer) with digital recording, operated continuously throughout the airborne data acquisition, with a sampling interval of 1 second (1 Hz) and sensitivity of 0.1 nT. The ground and airborne system clocks synchronized using GPS time, to an accuracy of far better than 1 second



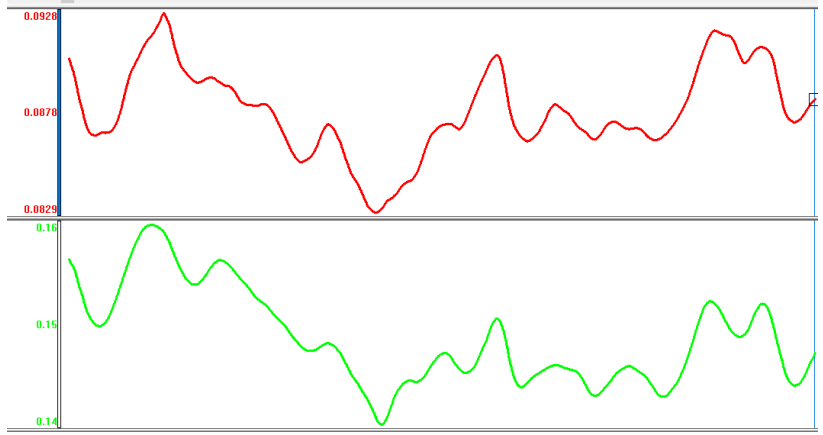
“Passive” EM measurements output

(with additional electric component base station)

VLF data extraction

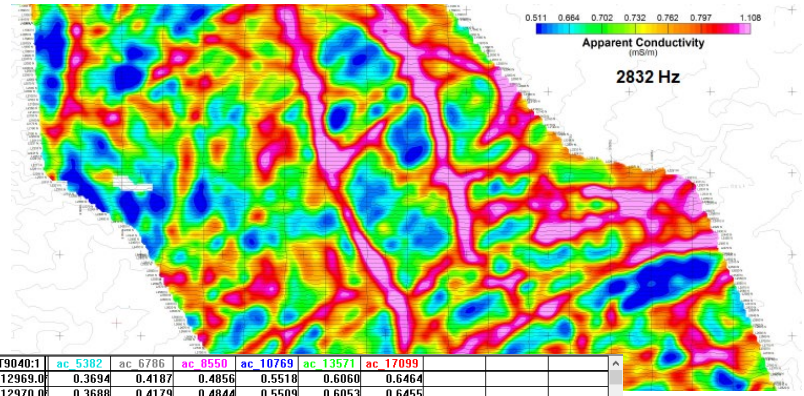


L1180:19	Amplitude_1	Azimuth_1	TiltAngle_1	El_Vert_1	El_Plan_1	Amplitude_2	Azimuth_2	TiltAngle_2	El_Vert_2	El_Plan_2
50188.0	* 0.0884	54.90	4.30	-0.04	-0.07	0.15	53.00	4.30	-0.04	0.16
50189.0	* 0.0884	55.30	3.40	-0.04	-0.10	0.15	52.30	3.40	-0.03	0.22
50190.0	* 0.0884	55.10	2.60	-0.04	0.01	0.15	52.20	2.60	-0.04	0.01
50191.0	* 0.0884	56.40	1.60	-0.04	-0.16	0.15	52.20	1.90	-0.04	0.10
50192.0	* 0.0885	54.60	1.80	-0.05	-0.14	0.15	53.00	1.80	-0.04	0.19
50193.0	* 0.0885	55.30	1.50	-0.05	-0.19	0.15	52.40	1.70	-0.04	0.13
50194.0	* 0.0885	57.00	1.80	-0.05	-0.18	0.15	53.00	1.90	-0.04	0.06

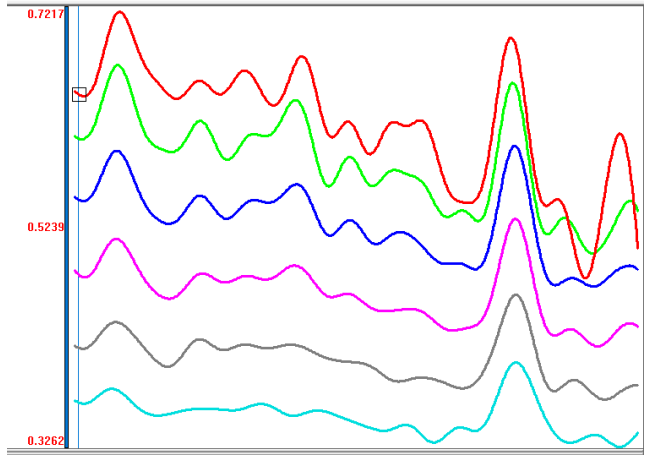


VLF amplitude

Natural field AFMAG data extraction



T9040:1	ac_5382	ac_6786	ac_8550	ac_10769	ac_13571	ac_17099
12969.0	0.3694	0.4187	0.4856	0.5518	0.6060	0.6464
12970.0	0.3688	0.4179	0.4844	0.5509	0.6053	0.6455
12971.0	0.3682	0.4173	0.4834	0.5501	0.6046	0.6446
12972.0	0.3677	0.4167	0.4824	0.5493	0.6041	0.6438
12973.0	0.3673	0.4162	0.4815	0.5487	0.6036	0.6431
12974.0	0.3670	0.4159	0.4808	0.5481	0.6033	0.6425
12975.0	0.3667	0.4156	0.4802	0.5478	0.6031	0.6420
12976.0	0.3665	0.4155	0.4797	0.5475	0.6031	0.6416



Apparent Conductivities

Flight Specifications

1. Flight Lines

Optimum terrain clearances for the helicopter and instrumentation during normal survey flying are:

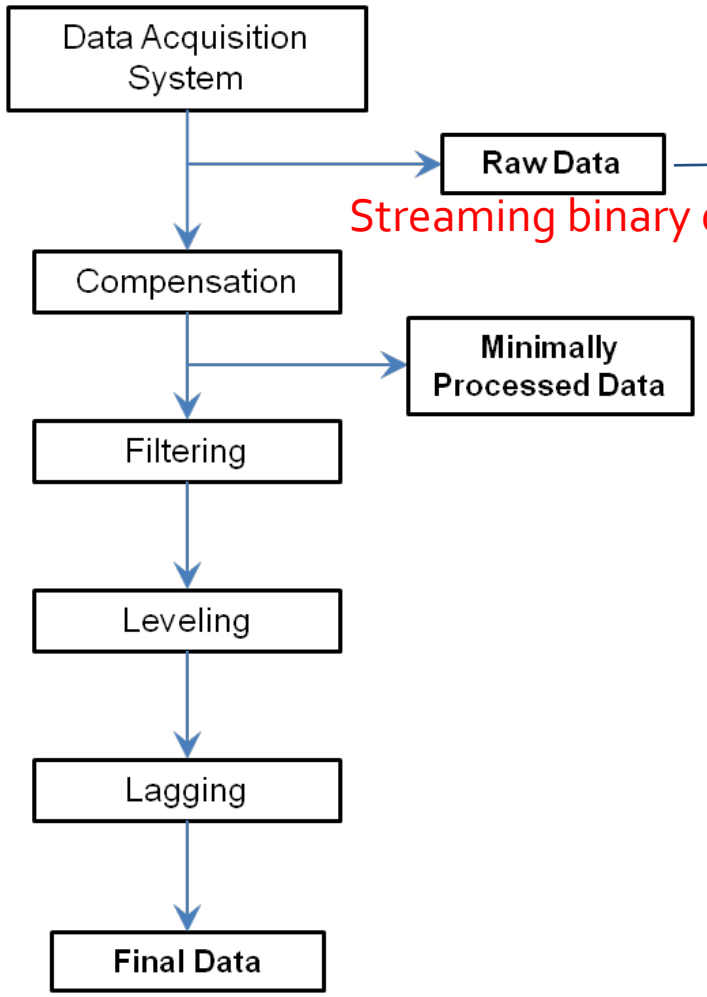
Helicopter - 80 meters
EM sensor - 30 meters
Magnetic sensor – 50 meters

Terrain clearance may vary, based on the pilot's judgement of safe flying conditions around man-made structures or in rugged terrain.

2. Airspeed

Normal helicopter airspeed will be approximately 80 - 100 km/hr, but this may vary in areas of rugged terrain. With a data-recording rate of 0.1 point per second, geophysical measurements are acquired approximately every 2 meters along the survey line.

TargetEM data processing

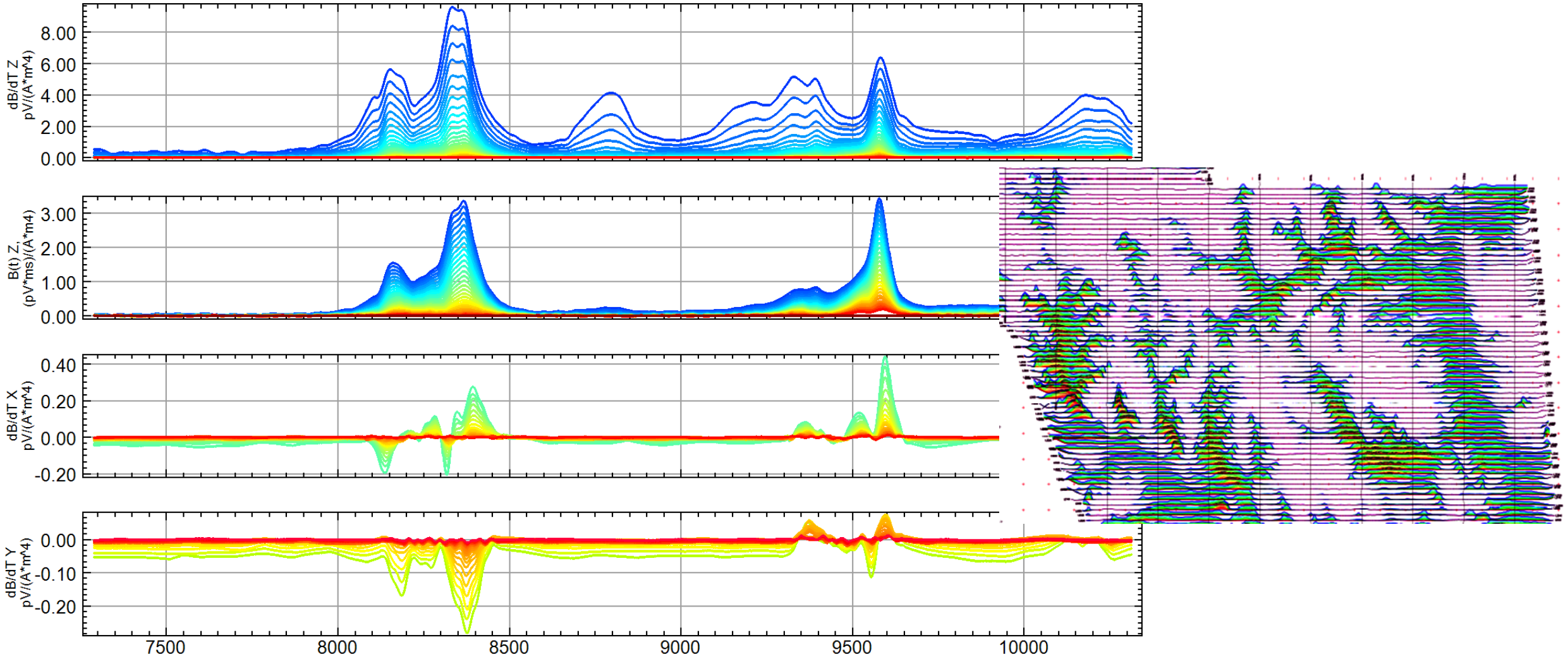


Stacking → Converting (XYZ, ASCII)

EGL proprietary software

Oasis Montaj, geosoft

TargetEM time-domain measurements output



TargetEM advantages

- Fast assembling/disassembling
- Very low windage
- high-quality signal-to-noise levels
- Square primary field waveform with very short turn-off
- Three XYZ components dB/dT; B-field Z and additional passive EM field data (VLF and AFMAG)
- Customization based on terrain and desired penetration depth offering multiple loop sizes
- full suite of software for quality control, processing and interpretation of the airborne EM geophysical data

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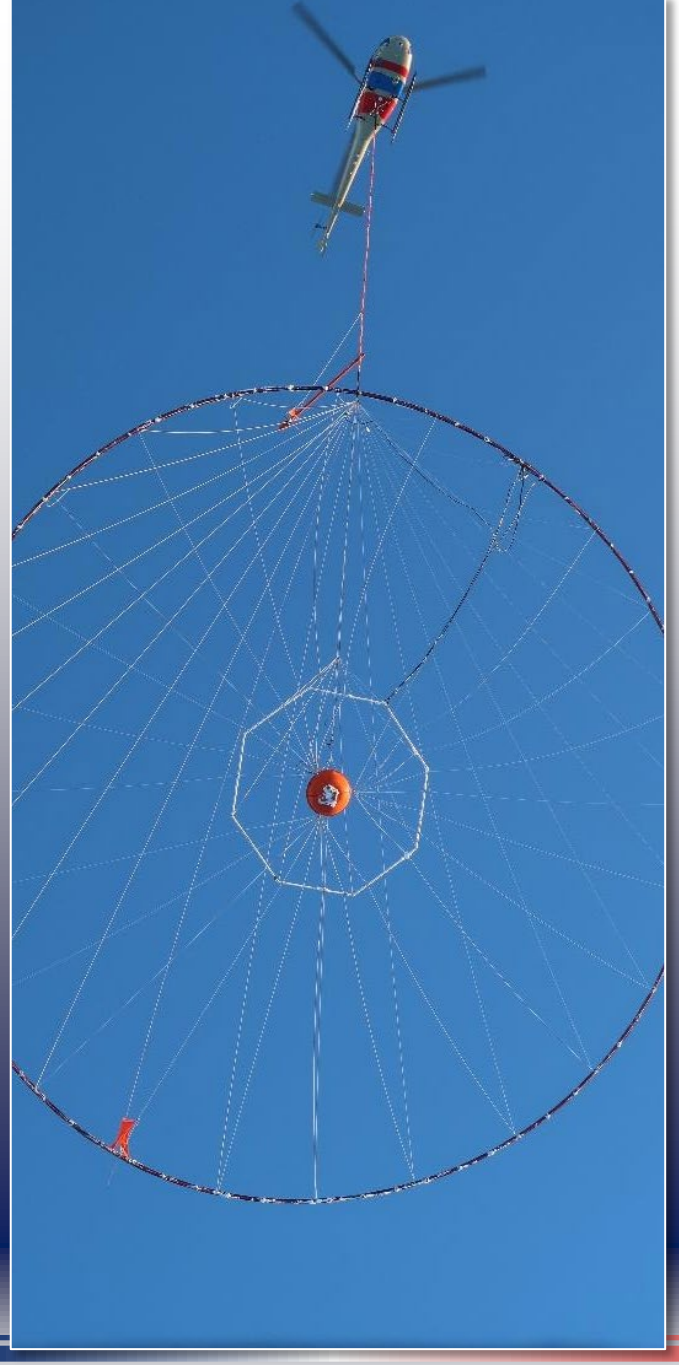

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