

TELLUS AIRBORNE GEOPHYSICAL SURVEY

ELECTROMAGNETIC (EM) DATA RE-RELEASE

BLOCKS A1, A2, A3, A4, WFD (WATERFORD) AND TB (TELLUS BORDER)

May 2022

1. DETAILS OF RE-RELEASED EM DATA

Tellus airborne geophysical surveys were flown over the Tellus Border (TB), Waterford (WFD), A1, A2, A3 and A4 blocks between October 2011 and September 2017 (Table 1 and Figure 1). Geophysical data (magnetic, radiometric and electromagnetic) were released publicly online for each data block shortly after the completion of each survey.

The electromagnetic (EM) data for each of these survey blocks have been reprocessed recently by acquisition contractor Sander Geophysics Limited (SGL), to bring the data processing and resulting data in line with blocks A5 and younger. These reprocessed data are now released publicly.

On-going, block-by-block data acquisition provides opportunity to adjust the baselines (zero levels) and the long-wavelength levelling of the EM responses in older data blocks, using information provided by the newer data blocks. Newly recorded data blocks, particularly those with offshore transects over seawater, provide new calibration constraints on the baselines of the entire dataset, and which can be applied retrospectively to previously acquired data.

In the course of ongoing Tellus survey work, SGL also developed a new methodology for deriving a powerline-monitor data channel, which provides an indication of potential disturbance of the EM data by powerlines. The new methodology is based on using the magnetic data that are recorded during flight. Powerline-monitor data, derived using the “new” methodology, have been included in EM data releases from Block A5 onwards. The magnetic data of earlier survey blocks have been re-processed recently by SGL to derive equivalent powerline-monitor data for the earlier surveyed blocks. These new, magnetic powerline-monitor data are now available for release.

The new EM data re-released here for the Tellus Border (TB), Waterford (WFD), A1, A2, A3 and A4 blocks replace the older data released for each block, and contain the following revisions:

1. Revision of the baselines and long-wavelength levelling of the EM response data channels, for all four data frequencies (P09lev, Q09lev, P3lev, Q3lev, P12lev, Q12lev, P25lev, Q25lev channels).
2. Revision of all resistivity models derived from the EM response data, for all four data frequencies (all “ExtendedRes” data channels).
3. Provision of a new powerline-monitor data channel (PLM_nT channel).

The public data release consists of the following data products, provided separately for each survey block:

1. Flight-line-based ascii XYZ files, containing all data channels (refer to Sections 3 and 5).
2. Grids of the resistivity models at each frequency, in several different grid formats (refer to Sections 4 and 6).

Highlights of the Tellus airborne geophysical survey specification include:

1. Frequency domain electromagnetic data acquired at four-frequencies: 912, 3005, 11962 and 24510 Hz, providing in-phase and quadrature EM responses at each frequency and resistivity transforms (models) derived for each frequency.
2. Flight-line spacing: 200 m.
3. Flight altitude (ground clearance): nominal 60 m, increasing to 214 m over sensitive areas (e.g., livestock farms) and 305 m over larger population centres.
4. Along-line measurement spacing: nominally 6 m.

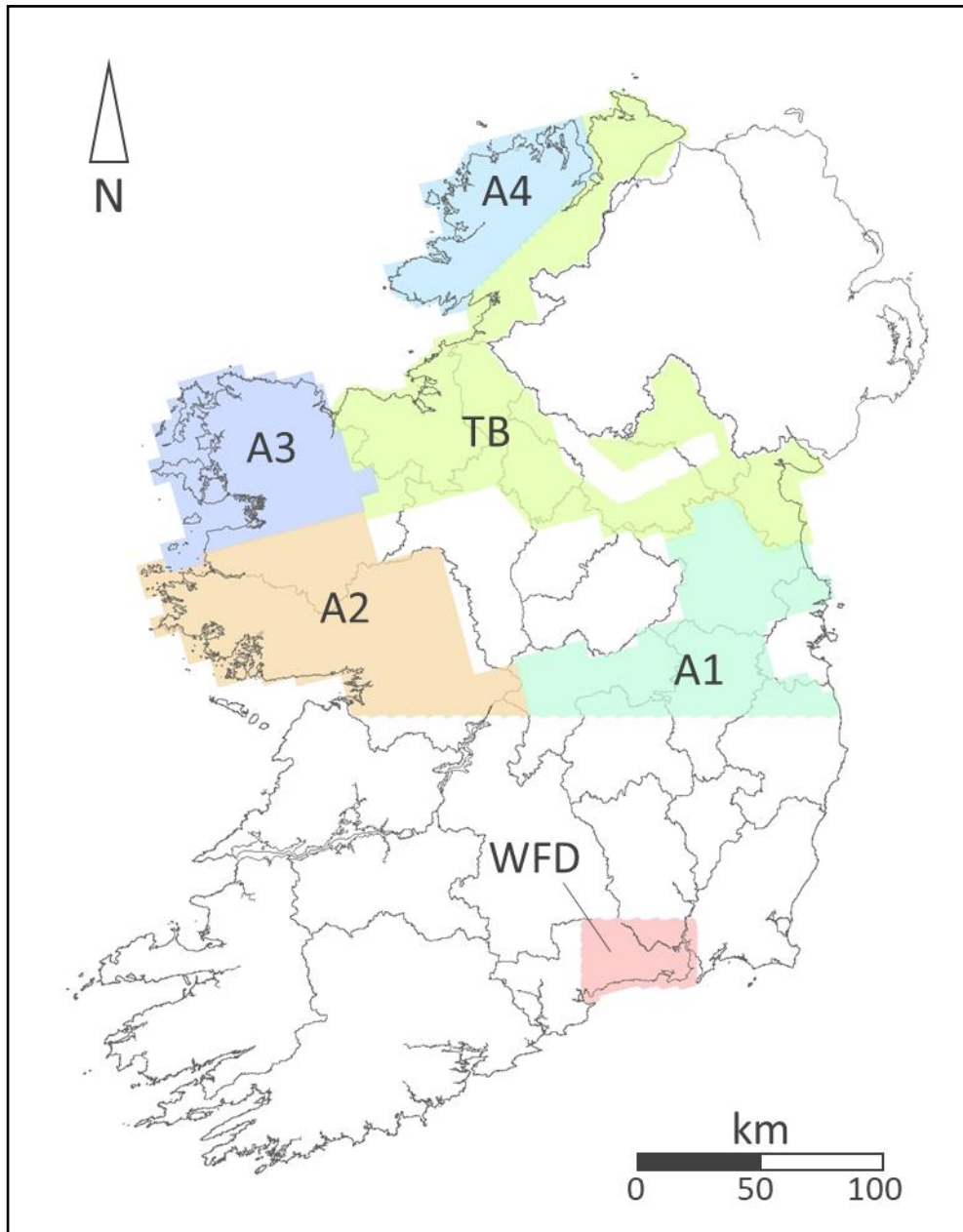


Figure 1. Map of Ireland with county boundaries, showing locality of Tellus A1, A2, A3, A4, TB (Tellus Border) and WFD (Waterford) Blocks. Electromagnetic data are re-released for all survey blocks shown.

Table 1. Summary of Tellus survey technical specifications – electromagnetic data.

Geophysical Contractor	Sander Geophysics Limited (SGL)
Survey Start – End Dates	
Block A1	30/06/2015 – 31/10/2015
Block A2	02/06/2016 – 13/10/2016
Block A3	27/04/2017 – 30/09/2017
Block A4	01/05/2017 – 10/07/2017
Block TB	26/10/2011 – 15/07/2012
Block WFD	08/05/2016 – 30/05/2016
Aircraft Type	De Havilland DHC-6 Twin Otter
Total Line Kilometres (Traverse + Control Lines)	
Block A1	32,673 km
Block A2	43,167 km
Block A3	27,620 km
Block A4	18,742 km
Block TB	54,427 km
Block WFD	6,563 km
Traverse Lines	
Line Direction	N15°W
Line Spacing	200 m
Control Lines	
Line Direction	E15°N
Line Spacing	2000 m
Survey Altitude	
Nominal	60 m
Sensitive Areas	214 m
Large Population Centres	305 m
Aircraft Ground Speed Nominal	60 m/s
Instruments Carried	
Frequency Domain Electromagnetics (FEM)	Four-frequency system: 912, 3005, 11962 and 24510 Hz
Sample Rates	
Electromagnetics	1 Hz (nominal 6 m spacing)
Coordinate System	
Datum	IRENET95
Projection	Irish Transverse Mercator (ITM)

2. URLs FOR DATA DOWNLOAD

Both line-based (see Section 3 for details) and grid-based (see Section 4) versions of the data, by survey block, are available. Data and supporting documentation may be downloaded from the GSI website at the following URLs:

- **Frequency domain electromagnetic line data and grids:**

A1 Block

[GSI_Tellus_A1_EM_RERELEASE_DATA_2022.zip] and

[GSI_Tellus_A1_EM_RERELEASE_GRIDS_2022.zip]

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A1_EM_RERELEASE_DATA_2022.zip

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A1_EM_RERELEASE_GRIDS_2022.zip

A2 Block

[GSI_Tellus_A2_EM_RERELEASE_DATA_2022.zip] and

[GSI_Tellus_A2_EM_RERELEASE_GRIDS_2022.zip]

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A2_EM_RERELEASE_DATA_2022.zip

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A2_EM_RERELEASE_GRIDS_2022.zip

A3 Block

[GSI_Tellus_A3_EM_RERELEASE_DATA_2022.zip] and

[GSI_Tellus_A3_EM_RERELEASE_GRIDS_2022.zip]

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A3_EM_RERELEASE_DATA_2022.zip

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A3_EM_RERELEASE_GRIDS_2022.zip

A4 Block

[GSI_Tellus_A4_EM_RERELEASE_DATA_2022.zip] and

[GSI_Tellus_A4_EM_RERELEASE_GRIDS_2022.zip]

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A4_EM_RERELEASE_DATA_2022.zip

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_A4_EM_RERELEASE_GRIDS_2022.zip

TB Block

[GSI_Tellus_TB_EM_RERELEASE_DATA_2022.zip] and

[GSI_Tellus_TB_EM_RERELEASE_GRIDS_2022.zip]

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_TB_EM_RERELEASE_DATA_2022.zip

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_TB_EM_RERELEASE_GRIDS_2022.zip

WFD Block

[GSI_Tellus_WFD_EM_RERELEASE_DATA_2022.zip] and

[GSI_Tellus_WFD_EM_RERELEASE_GRIDS_2022.zip]

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_WFD_EM_RERELEASE_DATA_2022.zip

https://gsi.geodata.gov.ie/downloads/Geophysics/Data/GSI_Tellus_WFD_EM_RERELEASE_GRIDS_2022.zip

For support and further information at GSI: Dr James Hodgson, Tellus Project Manager, jim.hodgson@gsi.ie, +353 (0)1 6782742.

3. RELEASE INFORMATION FOR LINE DATA

Line-based data for all flight lines are provided in ascii-format files, separately for each survey block:

- **Frequency domain electromagnetic data:**

[EM_A1_2022_RERELEASE_WEB.XYZ]

[EM_A2_2022_RERELEASE_WEB.XYZ]

[EM_A3_2022_RERELEASE_WEB.XYZ]

[EM_A4_2022_RERELEASE_WEB.XYZ]

[EM_TB_2022_RERELEASE_WEB.XYZ]

[EM_WFD_2022_RERELEASE_WEB.XYZ]

The file format is suitable for direct import into Geosoft Oasis Montaj software or into any other software programme with an ascii, column-based import capacity. The data channel (column) descriptions for each data file are fully specified in the readme.txt file that accompanies the data. For reference, the readme.txt file is included below in Section 5 (showing an example for the A1 Block, with the same format being used for the other blocks).

While the line-based data files contain a number of supplementary data channels (providing, e.g., flight altitude, power-line monitor, digital elevation model and geographic coordinate data), the primary data channels of interest to the data user are likely to be:

- **Frequency domain electromagnetic data:**

Resistivity models (derived using approximate, half-space resistivity transformations)

- “ExtendedRes09_GRID”, “ExtendedRes3_GRID”, “ExtendedRes12_GRID” and “ExtendedRes25_GRID” data channels.

Final microlevelled resistivity model data for 912, 3005, 11962 and 24510 Hz respectively, nulled for flight altitudes greater than 120 m above ground level (in ohm.m units).

- “ExtendedResSlice10_GRID”, “ExtendedResSlice30_GRID”, “ExtendedResSlice60_GRID” and “ExtendedResSlice100_GRID” channels.

Resistivity depth slices at 10, 30, 60 and 100 m respectively, nulled for flight altitudes greater than 120 m above ground level (in ohm.m units).

Electromagnetic response data (for users wishing to model the EM data independently)

- “P09lev”, “Q09lev”, “P3lev”, “Q3lev”, “P12lev”, “Q12lev”, “P25lev”, “Q25lev” data channels.

Final levelled in-phase and quadrature responses at 912, 3005, 11962 and 24510 Hz respectively (in ppm units).

4. RELEASE INFORMATION FOR GRID DATA

Grids of the data, separately for each survey block, are provided for selected resistivity model data channels and may be located and downloaded at the URLs indicated above. Several file formats are provided: Geosoft Binary (. GRD), TIFF image (.TIF) and Grid Exchange (. GXF). Data are gridded at a 50 m interval (inverse distance weighted algorithm, 175 m search radius and 175 m blanking distance), using an Irish Transverse Mercator projection with IRENET95 datum.

For reference, an example readme.txt file associated with the grid data is included below in Section 6 (showing an example for the A1 Block, with the same format being used for the other blocks).

- **Frequency domain electromagnetic grids (showing example for A1 Block):**

- “EM_A1_2022_RES09_EXTENDED_GRID”
“EM_A1_2022_RES3_EXTENDED_GRID”
“EM_A1_2022_RES12_EXTENDED_GRID”
“EM_A1_2022_RES25_EXTENDED_GRID”

Micro-levelled resistivity models for 912, 3005, 11962 and 24510 Hz respectively, nulled for flight altitudes greater than 120 m above ground level (in ohm.m).

5. FREQUENCY DOMAIN ELECTROMAGNETIC LINE DATA README FILE [EM_A1_2022_Rerelease_ReadMe_DATA.txt]

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This readme file relates to data from files:

EM_A1_2022_RERELEASE_WEB1.XYZ, EM_A1_2022_RERELEASE_WEB2.XYZ and EM_A1_2022_RERELEASE_WEB3.XYZ

Airborne electromagnetic geophysical data collected between 30/06/2015 – 31/10/2015 by Geological Survey Ireland, Tellus Project.

Wordpad text editor is recommended to read the XYZ data correctly. Open Wordpad and click on view, then go to word wrap and tick no wrap

Data type: Contractor delivered data from the A1 survey block.

Date of collection: Data collected between 30/06/2015 – 31/10/2015.

Geographical extent: A1 survey block covering Meath, Kildare, Offaly, rural Dublin and parts of Laois, Wicklow.

Contractor: Sander Geophysics Ltd

Client: Geological Survey Ireland (GSI)

Data production: GSI merge of FEM data (contractor delivery DLV2088) and powerline monitor (PLM) data (contractor delivery DLV2424).

Date of data release: 15 April 2022

For data queries please contact: tellus@gsi.ie

The data contain the channels described below:

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File Names: EM_A1_2022_RERELEASE_WEB1.XYZ (L11001 - L11394)

EM_A1_2022_RERELEASE_WEB2.XYZ (L11395 - L11600)

EM_A1_2022_RERELEASE_WEB3.XYZ (L11601 - L11660, T10101 - T10149)

(L = traverse line, T = control line)

Name	Units	Description
ITM_X	m	X coordinate, IRENET95 ITM
ITM_Y	m	Y coordinate, IRENET95 ITM
DATE	-	Date YYYYMMDD
LINE	-	Line number
LONG	degree	Longitude, WGS-84
LAT	degree	Latitude, WGS-84
MSLHGT	m	GPS Elevation above Mean Sea Level
RADAR	m	Clearance above Terrain from Radar
DEM	m	Digital Elevation Model with respect to Mean Sea Level from Radar Clearance
P09lev	ppm	Levelled and filtered in-phase 912 Hz
Q09lev	ppm	Levelled and filtered quadrature 912 Hz
P3lev	ppm	Levelled and filtered in-phase 3005 Hz
Q3lev	ppm	Levelled and filtered quadrature 3005 Hz
P12lev	ppm	Levelled and filtered in-phase 11962 Hz
Q12lev	ppm	Levelled and filtered quadrature 11962 Hz
P25lev	ppm	Levelled and filtered in-phase 24510 Hz
Q25lev	ppm	Levelled and filtered quadrature 24510 Hz
PLM_nT	nT	Power line monitor
ExtendedRes09	ohm-m	Extended range resistivity, half-space model, 912 Hz
ExtendedRes3	ohm-m	Extended range resistivity, half-space model, 3005 Hz
ExtendedRes12	ohm-m	Extended range resistivity, half-space model, 11962 Hz
ExtendedRes25	ohm-m	Extended range resistivity, half-space model, 24510 Hz
ExtendedRes09_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 912 Hz, nulled >120 m
ExtendedRes3_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 3005 Hz, nulled >120 m
ExtendedRes12_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 11962 Hz, nulled >120 m
ExtendedRes25_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 24510 Hz, nulled >120 m
ExtendedResSlice10_GRID	ohm-m	Microlevelled extended range resistivity depth slice at 10 m, nulled >120 m
ExtendedResSlice30_GRID	ohm-m	Microlevelled extended range resistivity depth slice at 30 m, nulled >120 m

ExtendedResSlice60_GRID	ohm-m	Microlevelled extended range resistivity depth slice at 60 m, nulled >120 m
ExtendedResSlice100_GRID	ohm-m	Microlevelled extended range resistivity depth slice at 100 m, nulled >120 m

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6. FREQUENCY DOMAIN ELECTROMAGNETIC GRID DATA README FILE [EM_A1_2022_Rerelease_ReadMe_Grids.txt]

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This readme file relates to grid and image files contained in the file: [EM_A1_2022_RERELEASE_Grids.zip]

Date of data release: 15 April 2022

There are three different georeferenced grid/image data types provided for Tellus geophysical data maps.

.grd files are Geosoft grid files and can be opened in GIS softwares including Geosoft, ArcGIS (only with Geosoft ArcGIS plugin) and MAPINFO.

.tif files are a georeferenced coloured raster files.

.gxf are ASCII grid files and are an interchangeable raster file. This format can be opened in many GIS softwares.

Instructions on how to display in correct colour ramp in ArcGIS and QGIS are in the pdf included in this .zip

Images are intended to be viewed with in the Geosoft Cla 32 colour ramp. Included in this .zip file are an ArcGIS style file (Geosoft.Style) and a QGIS XML Colour ramp (Geosoft_Cla_32_qgis.XML). Geosoft Cla 32 colour ramps are included in this in both of these files.

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Name	Unit	Description
EM_A1_2022_RES09_EXTENDED_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 912 Hz, nulled >120 m
EM_A1_2022_RES3_EXTENDED_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 3005 Hz, nulled >120 m

EM_A1_2022_RES12_EXTENDED_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 11962 Hz, nulled >120 m
EM_A1_2022_RES25_EXTENDED_GRID	ohm-m	Microlevelled extended range resistivity, half-space model, 24510 Hz, nulled >120 m

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