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Aurora Geosciences Ltd was contracted to perform a review of publically available digital magnetic geophysical data submitted with assessment reports to develop standardized products and compilations. Only data submitted prior to March 2015 were considered.

The submitted georeferenced databases were standardized by producing ten common database fields. As a guiding principle, original database fields are firstly assigned to the standardized fields. If no equivalent field is present in the original database, the standardized field is calculated if possible. At a minimum, the east and north coordinates and the magnetic field must be assigned to produce any reprocessed products. The standard fields are appended to the submitted database and do not replace any original data.

_AR_UTME and _AR_UTMN	These channels must be assigned from the original database and cannot be calculated. The channels will be re-projected into UTM/NAD83 coordinates if not already using this projection/datum.
_AR_Long and _AR_Lat	These channels will be calculated if not present in the original database. Their format is decimal degrees using the NAD83 datum.
_AR_Line	Although redundant in a Geosoft database, this field makes it possible to recreate a line-based database from the ASCII csv format.
_AR_Date	If no date field is present in the original database, the date is harvested from the line metadata. The metadata is not reliably correct and if the variance is beyond specification, the starting date of the survey is used. The format is a decimal date.
_AR_DTM, _AR_Sensor_Height and _AR_Sensor_Z	These are related fields describing the elevation of the ground surface, the height of the sensor above the ground, and the elevation of the sensor respectively.
_AR_IGRF, _AR_Dec, _AR_Inc	The International Geomagnetic Reference Field strength, declination and inclination respectively. They are sampled for each data point using the longitude, latitude, sensor elevation and date channels. A default value for the DTM and sensor height is used where sensor elevation is absent from the original database.
_AR_Mag	This is a required field in the original database representing the total magnetic field after all survey corrections have been applied. This may include temporal, heading & lag and levelling corrections.
_AR_ResMag	Using the _AR_Mag and _AR_IGRF fields, the residual magnetic field is calculated for every data point.
_AR_LevMag_XXXX	By sampling the XXXX (e.g., 1150) 1:250 000 regional government aeromagnetic data at every point, the difference between the residual magnetic field and the regional field is taken. The mean difference is calculated for all the points in the survey that overlap with that 1:250 000 sheet and this mean difference is applied as a zeroth order datum shift to the residual data. This is repeated for every 1:250 000 sheet that the survey overlaps.

Databases are produced in Geosoft gdb and ASCII csv formats.

Data are gridded with a minimum curvature algorithm using a cell size that is generally  $\frac{1}{4}$  of the line spacing. From the grid of levelled data, 2D-FFT is used to reduce the magnetic field to the magnetic pole. An average value of the IGRF inclination and declination over the survey area is used for this reduction. The tilt derivative and first vertical derivative are calculated from the reduced-to-pole grid.

Four raster products, Total Magnetic Field (TMF), Reduced to the Pole magnetic field (RTP), Reduced to the Pole Tilt Derivative (RTP\_TDR), and Reduced to the Pole First Vertical Derivative (RTP\_VD) are provided in Geosoft grid, GeoTiff and PDF formats.

Survey lines are exported in ESRI shapefile format.

Compilations of assessment report products were produced by integration of the raster products with the pre-existing government regional 1:250 000 NTS sheet products (YGS Open Files 2020-8 through 2020-41). The first step towards the integration of individual assessment report data with regional compilations is the levelling of the assessment report data as described above. The residual magnetic field is compared to the sampled values in the compilation raster and the mean difference is applied as a zeroth order datum shift.

The four gridded products produced for each assessment report (residual magnetic field, reduced to pole, vertical derivative and tilt derivative) have pre-existing, analogous 1:250 000 products. The outline of the assessment report data is extracted and eroded by a buffer, typically 200 metres and the eroded buffer is windowed from each the four corresponding 1:250 000 compilations. Each assessment report grid is then blended with the compilation grid through averaging common points between the grids. By previously windowing out the eroded assessment report outline from the compilation, both fidelity to the higher quality assessment report data and a smooth transition to minimize edge artifacts are achieved.

This is an appropriate approach when the assessment report data are of higher quality than the compilation. Mostly this is true due to the higher resolution of data that is typical of a property-scale survey compared to a government regional-scale survey. However this is not universally the case and for every assessment report each of the four new blended grids are compared with the unaltered compilation. Assessment report grids which upon blending lower the quality of the compilation are manually rejected. A log file of accepted and rejected assessment reports for each 1:250 000 sheet is maintained.

An ASCII log file of the processing steps taken for each assessment report is also provided.

For further information, please contact the Yukon Geological Survey: [YGS-Minerals@gov.yk.ca](mailto:YGS-Minerals@gov.yk.ca).