Bonnifield electromagnetic and magnetic airborne geophysical survey data compilation

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Fugro Airborne Surveys Corp., and Stevens Exploration Manangement Corp.

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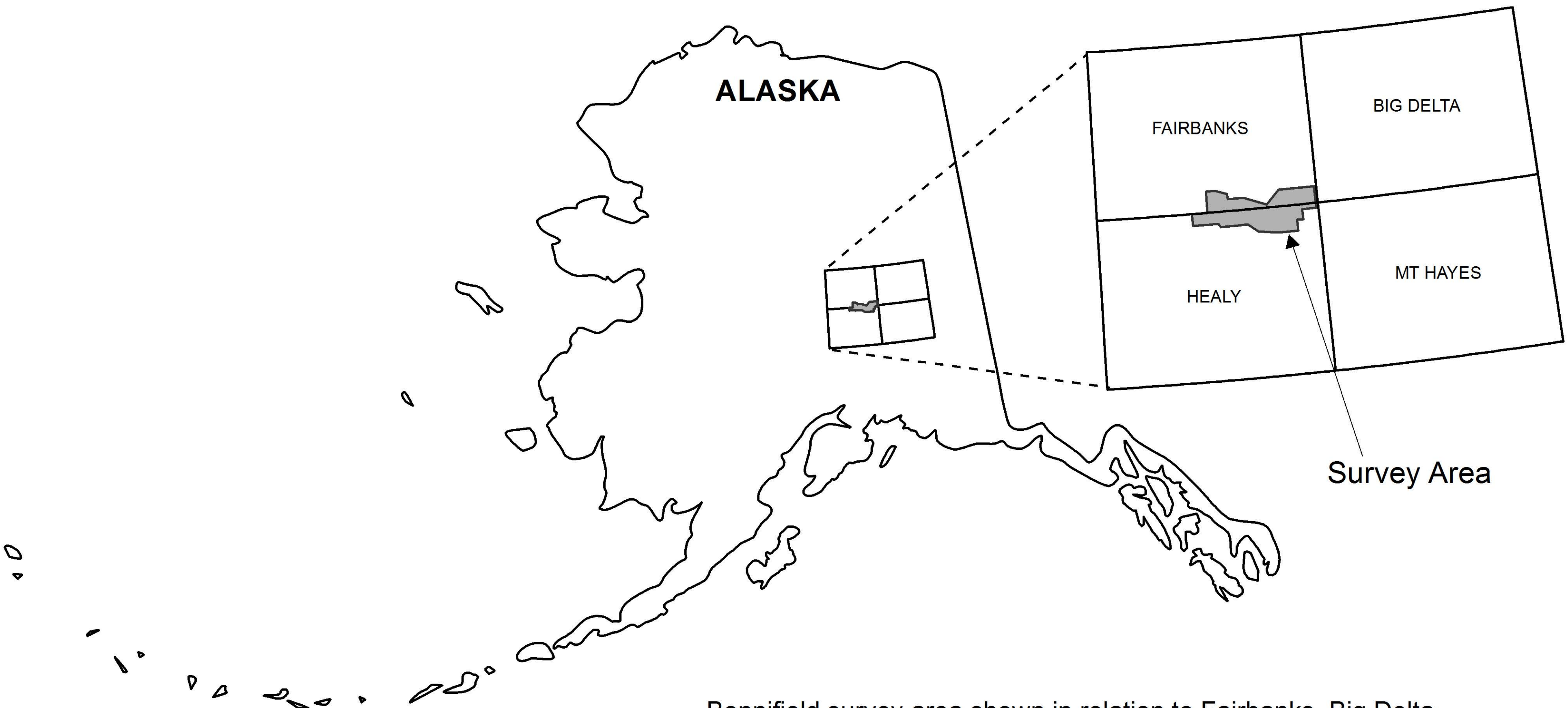
Survey Overview

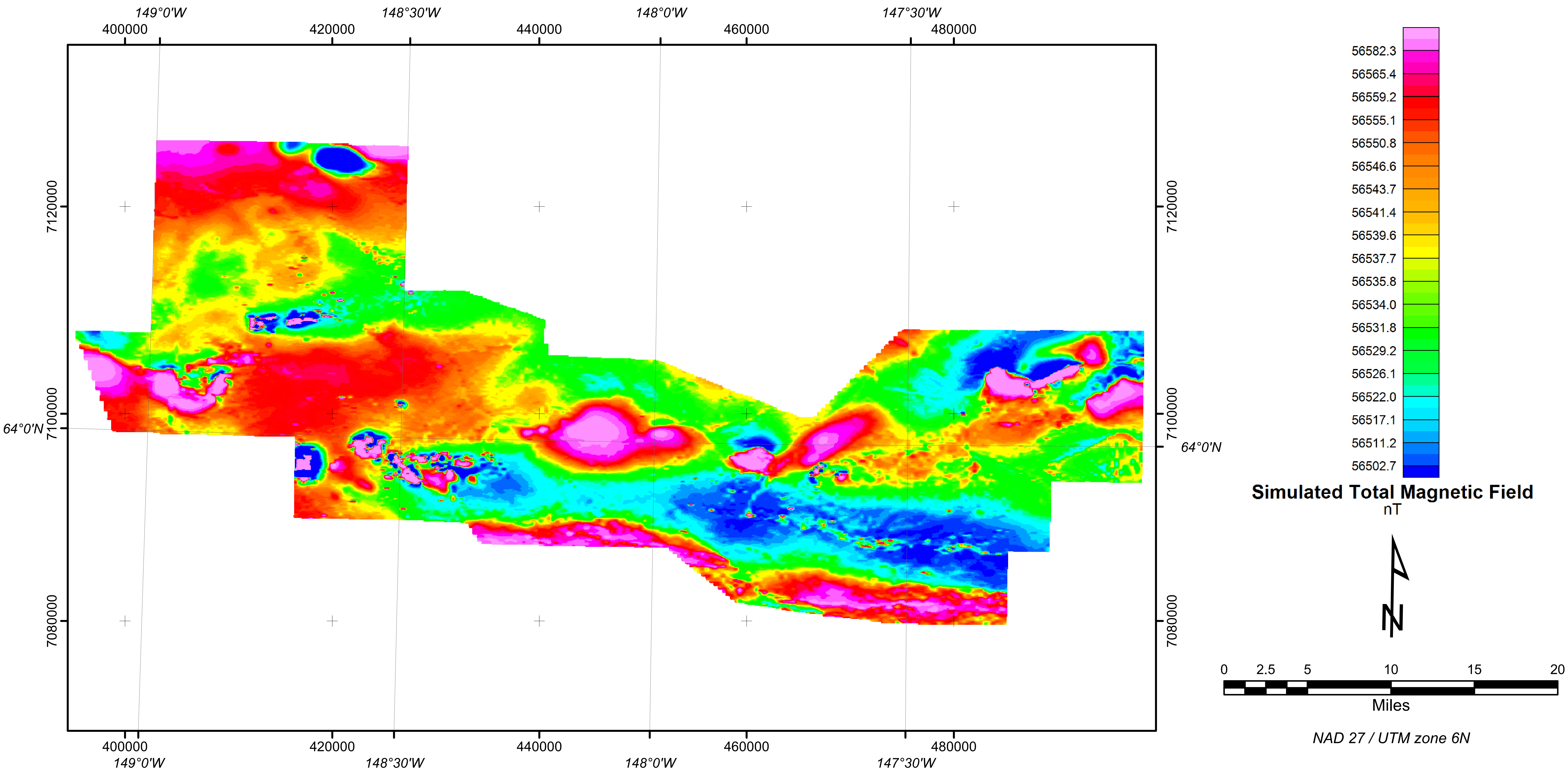


Bonnifield survey area shown in relation to Fairbanks, Big Delta, Healy, and Mount Hayes 1:250,000 scale quadrangles.

Residual Magnetic Field

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 censor. The total magnetic field data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for measured system lag, (2) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data (saved as tfmag in Bonnifield-Linedata.xyz), (3) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) using altimeter adjusted IGRF, (4) leveled to the tie line data (saved as magigrf in Bonnifield-Linedata.xyz), and (5) interpolated onto a regular 80m grid using a modified Akima (1970) technique. The new magnetic data and the Liberty Bell magnetic data were then gridded together to create the merged magnetic grid.

Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.



Calculated Vertical Gradient of the Magnetic Field

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using an FFT base frequency domain filtering algorithm. The total magnetic field data were subjected to a processing algorithm that enhances the response of magnetic bodies in the upper 500 m and attenuates the response of deeper bodies. The resulting vertical gradient grid(*cvg.grd) provides better definition and resolution of near-surface magnetic units. It also identifies weak magnetic features that may not be evident on the total field data.

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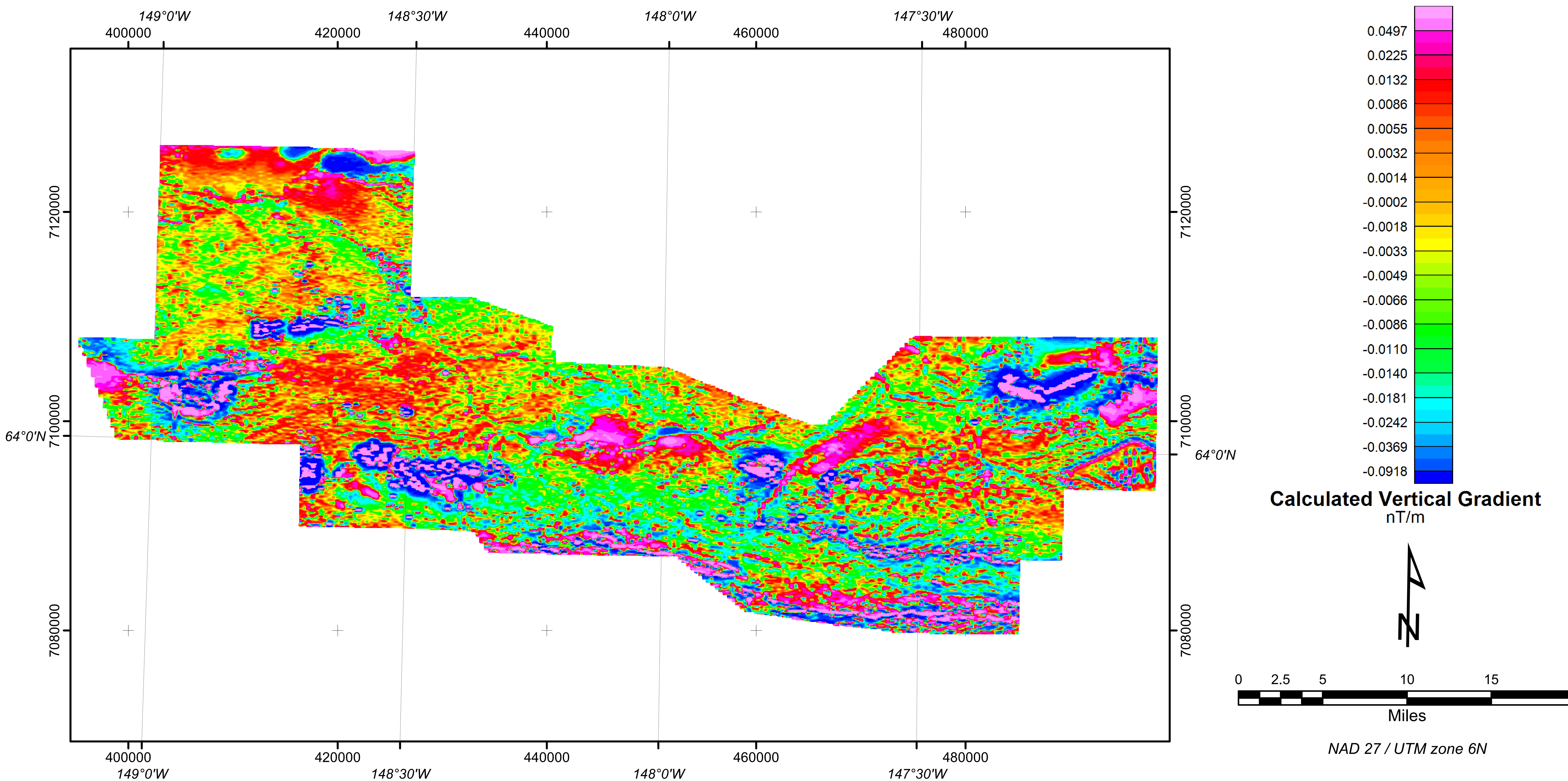

First Vertical Derivative of the Magnetic Field

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using an FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

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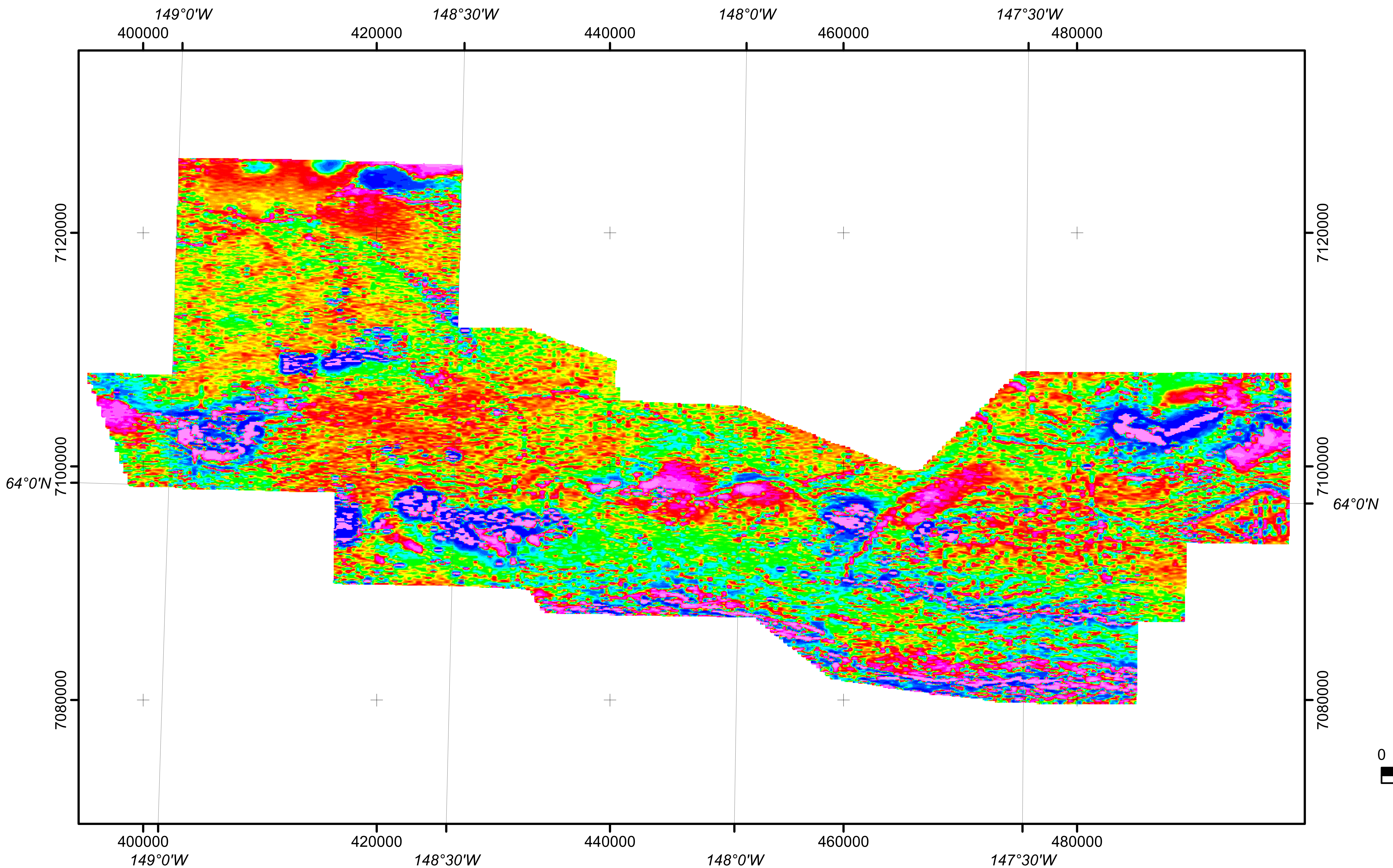

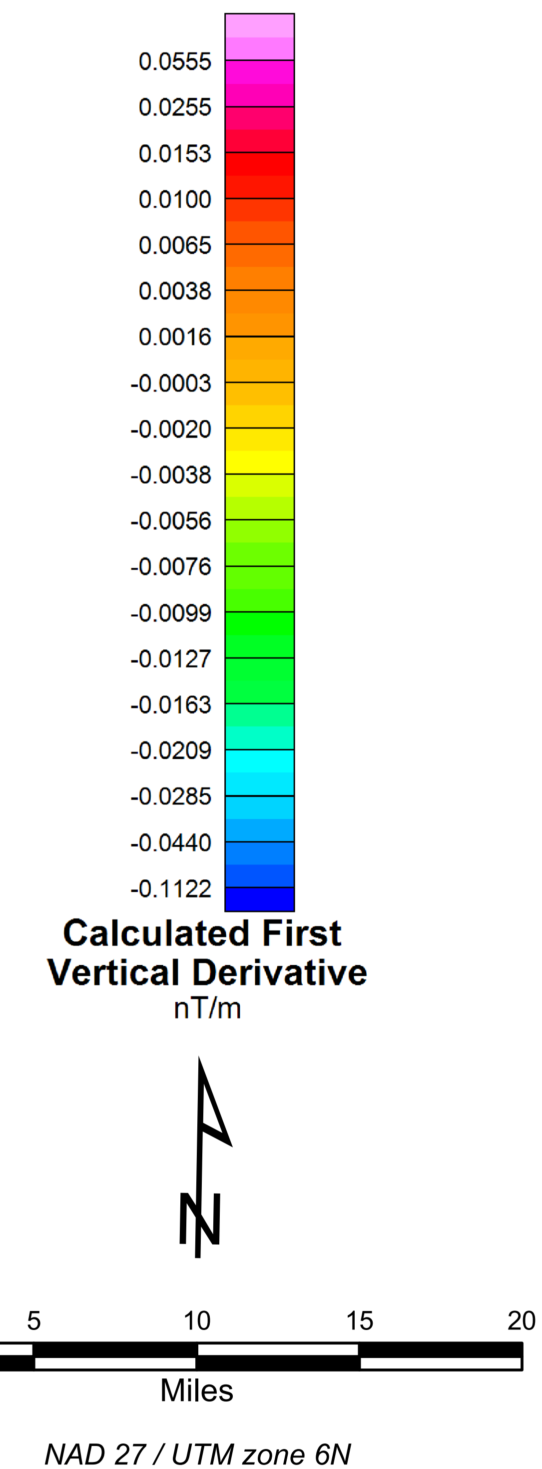

Resistivity 56,000 Hz Coplanar

The DIGHEM V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1114 (1000) and 5523 (5500) Hz while three horizontal coplanar-coil pairs operated at 916 (900), 7026 (7200), and 55,840 (56,000) Hz. The EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The EM inphase and quadrature data were drift corrected using base level data collected at high altitude (areas of no signal). Along-line filters are applied to the data to remove spheric spikes. The data were inspected for variations in phase, and a phase correction was applied to the data if necessary. Apparent resistivities were then calculated from the inphase and quadrature data for all frequencies based on a pseudo-layer half-space model. Manual leveling of the inphase and quadrature of each coil pair, based on the resistivity data and comparisons to the data from the other frequencies, was performed. Automated micro-leveling is carried out in areas of low signal. The new resistivity data and the Liberty Bell resistivity data were used to create the merged resistivity grids. The EM data were interpolated onto a regular 80m grid using a modified Akima (1970) technique. The resulting grids were subjected to a 3x3 hanning filter before contouring and map production.

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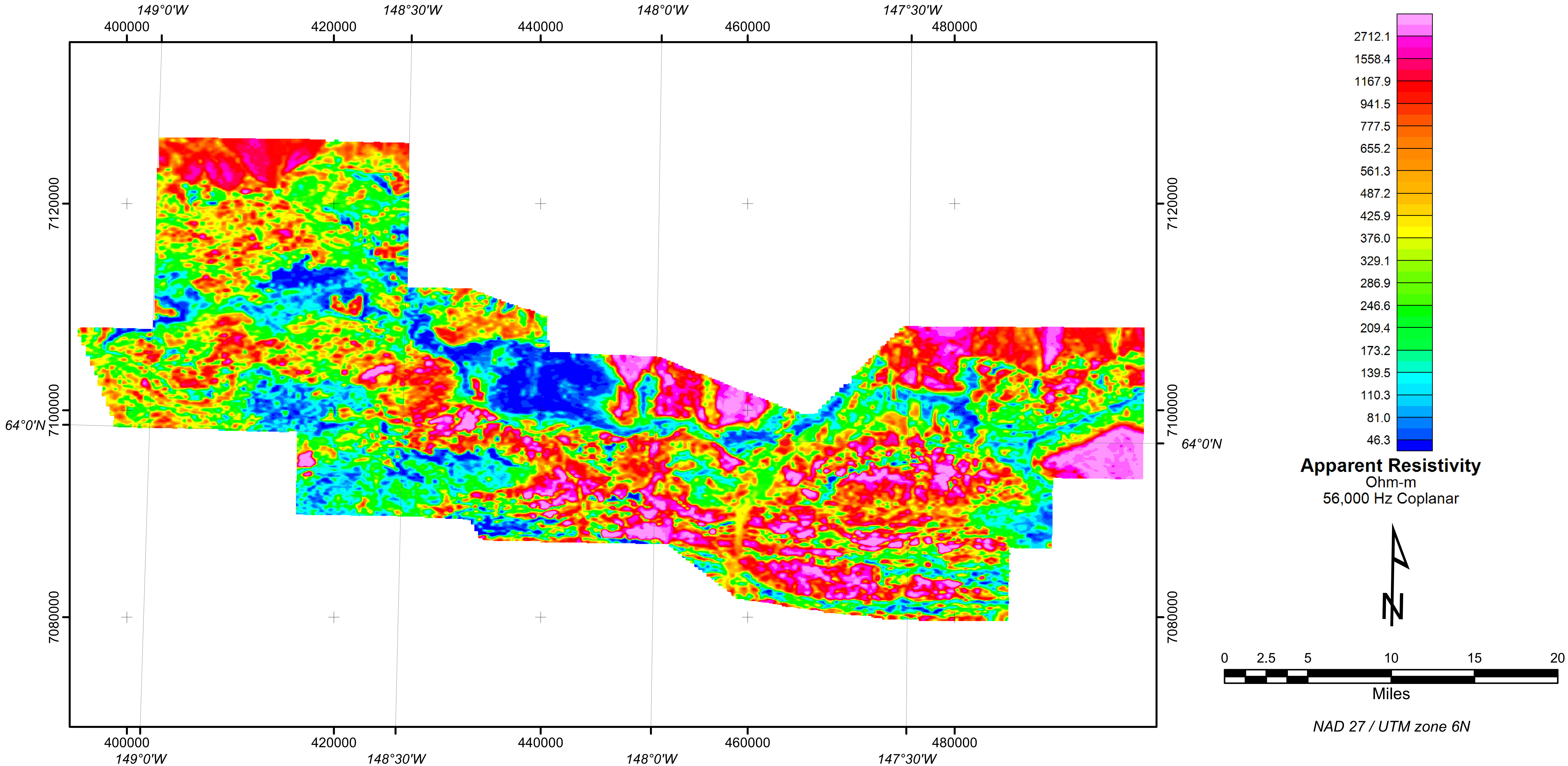

Resistivity 7200 Hz Coplanar

The DIGHEM V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1114 (1000) and 5523 (5500) Hz while three horizontal coplanar-coil pairs operated at 916 (900), 7026 (7200), and 55,840 (56,000) Hz. The EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The EM inphase and quadrature data were drift corrected using base level data collected at high altitude (areas of no signal). Along-line filters are applied to the data to remove spheric spikes. The data were inspected for variations in phase, and a phase correction was applied to the data if necessary. Apparent resistivities were then calculated from the inphase and quadrature data for all frequencies based on a pseudo-layer half-space model. Manual leveling of the inphase and quadrature of each coil pair, based on the resistivity data and comparisons to the data from the other frequencies, was performed. Automated micro-leveling is carried out in areas of low signal. The new resistivity data and the Liberty Bell resistivity data were used to create the merged resistivity grids. The EM data were interpolated onto a regular 80m grid using a modified Akima (1970) technique. The resulting grids were subjected to a 3x3 hanning filter before contouring and map production.

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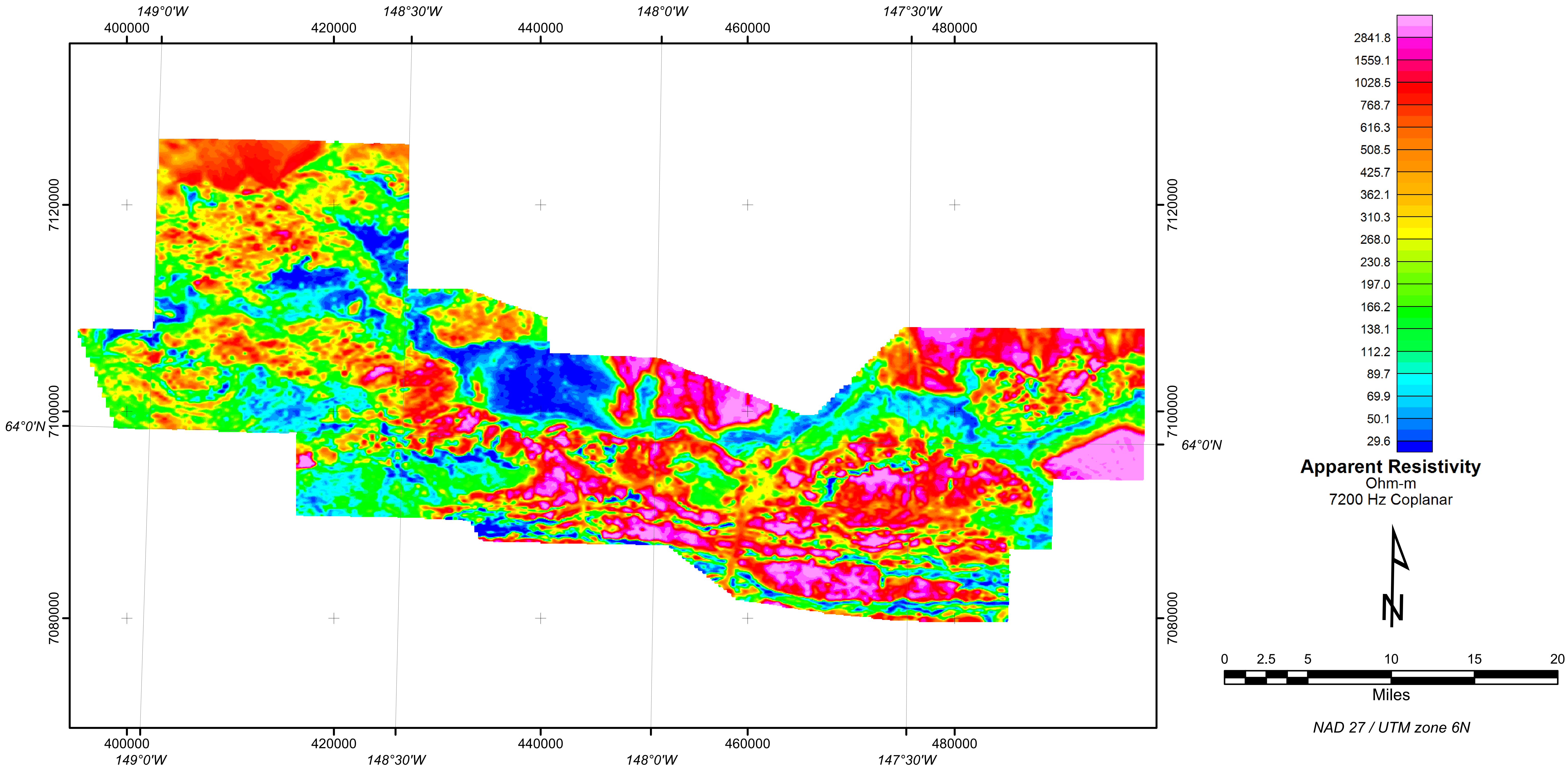

Resistivity 900 Hz Coplanar

The DIGHEM V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1114 (1000) and 5523 (5500) Hz while three horizontal coplanar-coil pairs operated at 916 (900), 7026 (7200), and 55,840 (56,000) Hz. The EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The EM inphase and quadrature data were drift corrected using base level data collected at high altitude (areas of no signal). Along-line filters are applied to the data to remove spheric spikes. The data were inspected for variations in phase, and a phase correction was applied to the data if necessary. Apparent resistivities were then calculated from the inphase and quadrature data for all frequencies based on a pseudo-layer half-space model. Manual leveling of the inphase and quadrature of each coil pair, based on the resistivity data and comparisons to the data from the other frequencies, was performed. Automated micro-leveling is carried out in areas of low signal. The new resistivity data and the Liberty Bell resistivity data were used to create the merged resistivity grids. The EM data were interpolated onto a regular 80m grid using a modified Akima (1970) technique. The resulting grids were subjected to a 3x3 hanning filter before contouring and map production.

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