Mapping Magnetic Properties of the Post-Wapiabi Sandstones from South-central Alberta Foothills

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Interpretation and modeling of HRAM data from the south-central Alberta Foothills show a remarkable correlation between certain lithostratigraphic units and the patterns of the magnetic anomalies. In the study area, siliciclastic strata dominate the surface geology; they have low magnetic susceptibility (10^{-6} – 10^{-2} SI), and therefore low magnetic intensity values (ranging between 9.8 and -10.8 nT). The field magnetic susceptibility measurements show an excellent correlation between the processed HRAM anomalies and the magnetic properties of the underlying rocks.

Most of the short wavelength magnetic anomalies are sourced in Upper Cretaceous post-Wapiabi strata (Lower and Upper Brazeau and Lower Coalspur), and appear to increase in intensity at the contact with the Tertiary Upper Coalspur Formation and with the underlying Alberta Group strata. The occurrence of HRAM anomalies associated with Brazeau and Lower Coalspur strata appear be related to the depositional history and provenance of post-Wapiabi sandstones of the southern and central Alberta Foothills.

The magnetization model constructed to reproduce the HRAM anomalies closely matches the observed values, and reflects the structural and lithological complexity of the study area. HRAM data show the different magnetic signatures of the Late Campanian – Late Maastrichtian sedimentary rocks and can be used to effectively map surface lithologies.

The study has shown that in fold and thrust belts HRAM data may be used effectively in early stages of exploration to map lithology and structure.