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New Geophysical Attribute Maps of Southern Saskatchewan and Southwestern Manitoba

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Using Principal Component Decomposition (PCD) and Empirical Mode Decomposition (EMD), we constructed new attribute maps combining the gravity and magnetic fields for the Western Canada Sedimentary Basin within a broad area south of the exposed Canadian Shield, from eastern Alberta, across southern Saskatchewan, into southwestern Manitoba. Multiple PCD-based attributes reveal zones of high- and low correlations between gravity and magnetic anomalies. These zones appear to form consistent trends correlated with tectonic structures and provide new information for interpretation. EMD results in classification of these structures by scale-length and possible relations to the depths of the sources of the anomalies; it also reduces random noise. In further studies, the new attribute maps will be inverted for magnetic and gravity source distributions, leading to improved and reliable images of the Precambrian basement topography in the study area.

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