Earth’s total intensity magnetic field profile data acquired near ground level and at measurement intervals as small as 1 m includes information on the spatial distribution of near surface magnetic dipoles. When acquired over exposed bedrock these profile data display magnetic textures (physical appearance or character of anomalies in the profile data) which can be characterized by several descriptive statistics, their power spectra, and their multifractal spectra. When acquired over relatively non-magnetic basin fill sediments that conceal shallow bedrock (less than 100 m depth), the upward continued magnetic textures of the concealed bedrock can be compared to the magnetic textures of adjacent exposed bedrock. These comparisons can, in some case, be used to help identify the lithology of the concealed bedrock which is a tremendous aid in assessing for or exploring for concealed mineral deposits.

In addition, ground-based magnetic profile data detects minute differences in the magnetic susceptibility of rock over small horizontal and vertical distances and these anomalies can be used for precise modeling of bedrock geometry and structure. This profile data typically contains valuable geologic information from concealed bedrock that may not be as visible in aeromagnetic data including areas of hydrothermal alteration, faults, and other geologic structures. In the San Rafael basin, southeastern Arizona, these data and interpretive techniques allow for the estimation of concealed lithologies as well as delineation of concealed faults and mineral resource targets.