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[PS]Tilt-Depth: A Simple Depth-Estimation Method Using First Order Magnetic Derivatives*

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Abstract

The Tilt derivative (or angle) is a generalized definition for the local phase. Mapping the magnetic Tilt angle has the advantage of enhancing weak magnetic anomalies, as compared to stronger magnetic anomalies due to the effective automatic gain control (AGC) imposed by the arctan function that restricts the Tilt angle to within the range –90° to +90°, irrespective of the amplitude or wavelength of the magnetic field. We have found that it is possible to simply use the Tilt angle contours of the reduced to pole (RTP) data to estimate both the location and depth of magnetic sources.

The method assumes the source is a buried vertical contact model. The zero contours indicate the location of source edges and the half distance between the -45° and +45° contours provides an estimate of the depth to top of the buried contact. We present synthetic and field examples to demonstrate the method. When the mapped region between the -45° and +45° contours is high-lighted in grey or in colour, the resulting map provides an intuitive means of spatially identifying the location and depth of the magnetic sources. Advantages of the method, called here the 'Tilt-Depth' method, are discussed as well as the effect of errors in RTP and dip-of-contact have on the resulting depth estimates.

Reference

Salem, A., S. Williams, J. D. Fairhead, D. Ravat and R. Smith, 2007, Tilt-depth method; A simple depth estimation method using first-order magnetic derivatives: SEG The Leading Edge, v. 26/12, p. 1502-1505.