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Analysis of gravity data using trend surfaces

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In this paper we have developed algorithms and related software programs for calculating of trend surfaces of higher order. These methods of analysis of trends, like mobile media applications are filtration systems for geophysical data in surface.
In particular we presented few case studies for gravity data and gravity maps.
Analysis with polynomial trend surfaces contributes to the recognition, isolation and measurement of trends that can be represented by surfaces or hyper-surfaces (in several sizes), thus achieving a separation in regional variations and local variations. This separation is achieved by adjusting the trend function at different values.
Trend surfaces using the regression analysis satisfy the criterion of least squares. The difference between the surface of trend and the observed value in a certain point is the residual value. Residual sum of squares of these values should be minimal as the criterion of least squares. The trend surface is considered as regional or large-scale and the residual value will be regarded as local or small-scale component. Removing the regional trend has the effect of highlighting local components represented by residual values. Surface analysis and hyper-surfaces principles are applied to the surface trend and any number of dimensions.
For hyper-surfaces we can work with polynomial functions with four or more variables (three variables of space and other variables for interest parameters) that have great importance in some applications.
In the paper we presented the mathematical developments about generalized trend surfaces and case studies about gravimetric data. The trend surfaces have the great advantage that the effect of regional anomalies can be expressed as analytic functions.
These tendency surfaces allows subsequent mathematical processing and interesting generalizations, with great advantage to work with polynomial functions compared with the original discrete data.
For gravity data we estimate the depth of anomalous sources depending on the degree of the polynomial trend surface and the dimensions of analyzed surface. The paper presents examples of both: depth of Moho and lower depths of anomalous sources.