

Digital Filtering and Modelling of the Gravity Field of the Bitterroot Valley, Western Montana.

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Previous gravity studies of the Bitterroot valley were based on simplifying assumptions about the density of valley fill and the smoothness of bedrock topography. This study uses density measurements of drill cores and known depths to bedrock from drill holes to provide greater control for modelling on a computer.

I used previously published Bouguer anomaly values from various authors. I assembled the data into a regularly spaced grid using a computer, then computed the Fourier coefficients of the grid with a fast Fourier transform (FFT) computer algorithm. The FFT coefficients were used for filtering in the frequency domain. In order to separate residual and regional gravity anomalies, I analyzed results from several band-pass and vertical continuation filter operations. Bedrock cross-sections were constructed with inverse and forward modelling, using residual gravity profiles.

The anomaly profiles and cross-sections were examined for evidence of faulting along the Stevensville and Tin Cup lineaments, two northeast trending fault sets which may bound a down-dropping block within the Bitterroot valley. No evidence was found for faulted bedrock in the valley along these two lineaments.