

Pitfalls and Limitations in the Interpretation of Crustal Reflection Profiles

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The advent of systematic seismic reflection profiling of the continental basement in the late 1970's led to a true revolution in the geophysical exploration of the continental lithosphere. Crust and lithospheric scale multichannel, controlled source surveys collected by individual scientists and national programs such as SINOPROBE now span many of the key portions of the earth's continents, albeit a large fraction of the continents remain unsurveyed. Such profiles STILL provide the highest resolution of lithospheric imagery in spite of major advances in complementary seismological techniques (e.g. receiver functions). The geological interpretation of certain features imaged by these profiles remain the focus of continuing, often frustrating, academic debate. Examples include the nature of lower crustal layering, the variability character of the Moho and the geometry of certain crustal scale faults. However, such controversy should not obscure the convincing nature of many of the published interpretations of deep reflection profiles. In either case, interpretations must be kept in the context of basic limitations of the technique in the context of the complexity of the structure usually involved. This presentation will review the need to adequately consider such issues as resolution, signal penetration, image distortion, focusing/defocusing and - perhaps most importantly- the misrepresentation of three dimensionality on two-dimensional profile when interpreting deep reflection profiles. Examples from INDEPTH, SINOPROBE and other national programs will be used to illustrate these concerns.

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