

Exploration of 3-D Basement Structure Around Osaka Basin by Joint Inversion of Refraction and Gravity Data

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A refraction experiment and gravity measurements were conducted in Osaka Basin, to explore the structure of this area. The 3-D basement structure is investigated by joint inversion of refraction and gravity data. The basement velocity is set as a variable and the sediment is assumed to be of a uniform velocity. The interface separating the sediment and basement is parameterized by Lagrange interpolation and linear constraints are used to avoid oscillatory artifacts in the result. Then, we use depth interpretations of reflection data and the height of the basement outcrop as absolute constraints. Our result is comparable to previous results although the interface is a smooth somewhat. However, this study is the first image, which is estimated by the combination of various kinds of datasets.

A seismic refraction experiment has been conducted in the Kobe-Hanshin area, in order to explore the underground structure of this region. Besides that, an extensive gravity measurement has been conducted around Osaka Basin as well. The distribution of gravity stations is denser than the distribution of sources and receivers of the refraction experiment.

The 3-D basement structure around Osaka Basin are investigated by joint inversion of seismic refraction and gravity data and compiled depth interpretations of seismic reflection. The basement velocity is set as a variable and the sediment is assumed to be of a uniform velocity. The interface separating the sediment and basement is then parameterized by Lagrange interpolation and linear constraints are introduced to avoid instability and oscillatory artifacts in the solution. Furthermore, we use depth interpretations of reflection data as absolute constraints in the offshore area because refraction and gravity data do not cover that area. The outcrop of basement around Rokko Mountain and Awaji Island is also constrained by absolute constraints.

Our result is comparable to previous results although the interface is a smooth somewhat. However, this study is the first image, which is estimated by the combination of various kinds of data sets.