

Experiment in estimate of strain rate using a kriging method

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Kriging is a group of geostatistical techniques to interpolate the value of a random field at an unobserved location from observations of its value at nearby locations. The theory has been developed for mining study, and with the improvement and wide application of the kriging approach, it has widely used in many study fields such as meteorology, forestry, and fisheries. The kriging belongs to a family of linear least squares estimation algorithms, in which the predicted values are represented using weighted linear combinations of the available samples. The weight is distributed statistically using a spatial dependence the data has intrinsically, and resultantly it is possible to fairly access both global and local variations.

When estimating strain rate field using geodetic data such as GPS, we are often faced with some difficulties, that is, it is not easy simultaneously to extract both so-called large- and small-scale deformations appropriately. A triangulation method using three neighboring sites gives us the finest spatial resolution in strain estimate, but there are disadvantages that the results strongly depend on how to construct the triangulation network and there are small-scale fluctuations which often prevent to access large-scale deformations like reflecting a tectonic loading. To suppress the fluctuations, several methods (e.g., Shen et al., 1996; Kato et al., 1998) have been proposed, in which spatial smoothing procedures are conducted, but these approaches possibly miss out small-scale deformations.

In this study, I conduct experiments in estimate of strain rate using the kriging method. As a test field I here adopt Taiwan that has complex deformation field. Consequently, the kriging method can extract well both the local and global variations, e.g., the tensional deformation which distributes in a central narrow zone running from north to south that other methods can not obtain. In this presentation, I will report the results in detail, with comparing with the results obtained from other methods (e.g., Shen et al., 1996).