Strain concentration zone based on GNSS data in southwest Japan and its possible application to a long-term forecast of inland earthquakes

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Two-decades GNSS observations have clarified strain concentration zones including the Niigata-Kobe Tectonic Zone in an inland area of the Japanese Islands. We removed elastic deformation due to interplate coupling along the Nankai Trough from the GNSS velocity data observed from April 2005 to December 2009 and calculated distribution of areal and maximum shear strain rate to clarify strain concentration zones in the inland area. We compared the strain-rate distribution with epicenters of shallow inland large earthquakes with M ≥6.
Most large earthquakes including the 2016 Kumamoto earthquake occur in the area of high rate of the maximum shear strain rate (Figure). Because the geodetically observed strain rate includes both elastic and inelastic strain, the strain rate is not directly related with an occurrence rate of earthquakes. However, the geodetic strain rate is an important data apparently related with earthquakes. It should be used as one of datasets to evaluate a long-term forecasting model of large earthquakes in the Japanese Islands.

Keywords: Strain concentration zone, GNSS, Inland earthquake

Maximum shear strain for 2005/4−2009/12 (DDC:15km)