

Understanding of crustal activity based on temporal changes of spatial correlations between various geophysical measures (2)

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The inland earthquakes which occur in the Japanese islands reflect crustal activities which are originally caused by the interactions between four plates surrounding the Japanese islands. For comprehensive understanding of the crustal activities, we first collected different kinds of geophysical data such as seismicity, GPS, gravity anomaly, and geothermal gradient, which reflect the crustal activities with different time scales. Our goal is to understand the crustal activities through spatiotemporal relationships between different geophysical parameters for various regions using statistical approaches.

In the previous meeting in 2008, we reported the temporal changes in spatial relationships between seismic and geodetic parameters (dilatation rate, maximum shear strain rate, seismic energy, and the number of earthquakes) with high-resolution temporally and spatially gridded data format (half a year and 0.05deg. by 0.05deg.), which were obtained from the JMA hypocenter catalog and the GSI GEONET data. In the analysis, we noticed the regions surrounding the source areas of the 2000 Western Tottori Earthquake and the 2004 Mid-Niigata Prefecture Earthquake and the time periods prior to these events. We mentioned that larger earthquake energy appeared to be radiated by relatively smaller-magnitude events before the two events in areas with smaller strain rates rather than larger ones.

In this meeting, we further quantitatively show the spatiotemporal relationships between seismicity and geodetic parameters for more regions with and without large inland earthquakes with a magnitude more than 6 using a statistical index. The statistical index was calculated as follows:

1. For a region and time, the maximum value of a seismicity parameter is searched.
2. The averaged value of a geodetic parameter is calculated from the grids with the seismicity parameter more than 80% of the maximum value obtained in the earlier process.
3. For the time half a year after, the same process is repeated.