

3D crustal deformation of Japan by GEONET

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Japan was originally created by subduction zones. The volcanic front and accretionary prisms are the result of convergence of plates, and the plate convergence make mountain area higher by the push force. Without subduction zones, earthquakes, crustal motions and Japan itself would never exist.

The GPS observation made it much easier to understand the crustal motions. The Geographical Survey Institute of Japan(GSI) has about 1400 GPS stations(GEONET) over Japan for observing Japanese crustal deformations, and the GEONET enabled us to watch how Japan continuously deforming. However, time series plotting or vector arrow figures of the GPS data are sometimes not easy to understand the three dimensional deformation with time.

In this study, we created 3D animations for Japanese crustal deformation using GPS data obtained by GSI, and make it easier to understand the Japanese crustal motions. The GSI already had created animation of Japan for horizontal motion of only limited time and area, whereas we can make animations for three dimensional deformation of any given time and area if the GPS data are available. The newly created animations revealed the detailed crustal deformation in Japan.

We compared our results to a 100 years leveling data of Japan and the geological data for about two million years. In spite of time differences, a lot of similarities can be seen on the pattern of deformation of Japan, and amount of crustal motions were comparable between GPS data and leveling data.

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