

## Compiling S-P times and first motion polarities for recent eqks and classification of the 1921 and 1922 eqks

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We compiled S-P times and first-motion polarities for earthquakes in Kanto region, central Japan on the basis of seismic phase data from 1923 to 2011 provided by the Japan Meteorological Agency (JMA), and that for 3,086 earthquakes which occurred from April 1st, 2008 to June 5th, 2012, from the Metropolitan Seismic Observation Network (MeSO-net). The number of target stations, where these data can be comparable with 26 stations which had operated in early stage of instrumental observations is 69 by JMA, and 19 by MeSO-net and other networks.

These data would be helpful for determining hypocenters and focal mechanism solutions of old earthquakes with limited instrumental data by comparing with S-P times and first-motion polarities for old earthquakes. As an example of application, we then compiled the characteristics of S-P times and first-motion polarities in southwestern Ibaraki and northwestern Chiba regions where the inter-mediate depth earthquakes frequently occur, and inferred the hypocenters and focal mechanism solutions of the 1921 Ibaraki-Ken-Nambu (M7.0) and 1922 Uraga-Channel (M6.8) earthquakes. Eleven first-motion polarities for the 1921 event are inconsistent for inter-plate earthquakes between the Okhotsk and Philippine Sea plates, and between the Philippine Sea and Pacific plates. Fourteen first-motion polarities and six S-P times for the 1922 event are similar for intra-slab earthquakes within PHS in and around southwestern Chiba with strike-slip fault mechanisms. These results strongly suggest that both the 1921 and 1922 events were not inter-plate earthquakes but intra-slab earthquakes.

In Japan, instrumental observation started in 1870's and seismographs and phase data (e.g., arrival times of typical phases, maximum amplitudes, first-motion polarities) have been persisted while some data were lost due to the fire. On the basis of these data, source parameters (hypocenters, focal mechanism solutions, and magnitude) for old earthquakes with limited instrumental data were estimated and cataloged. Determining hypocenters and focal mechanisms as back as possible prior to the start of JMA catalog is important to discuss long-term changes in seismicity. In Kanto, this period is especially important because it corresponds several tens of years before the 1923 Kanto earthquake and damaging earthquakes frequently occurred. However, the determinations of source parameters for old earthquakes have some difficulties. By using S-P times and first-motion polarities for recent earthquakes as "template", the accuracies in hypocenter locations and focal mechanism solutions for old earthquake would improve.

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