

GPS Data Analysis by Virtual Reference Station Method

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The Daisetsu mountain chain consists of many quaternary volcanoes over 2000 meters and is just located at the connection between Chishima Arc and Tohokunihon Arc. In this mountain chain, there are active volcanoes like Mt. Tokachi and Mt. Asahi. To investigate the precise deformation in the Daisetsu mountain chain is effective not only for the research of volcanic activity but also for the understanding of interaction among Okhotsk, Pacific, and Eurasia plates.

At present we understand the crustal deformation in Hokkaido by the result of country-wide GPS and triangulation survey by Geographical Survey Institute of Japan (GSI). But we have not understood local and precise crustal deformation in the Daisetsu mountain chain because there are not enough GPS survey-data at the mountain areas. We have carried out our own GPS campaigns from 1998 to 2001 at two areas of the Daisetsu mountain chain, which are near Mt. Tokachi and Omotedaisetsu. And we have analyzed their data mainly to know their local and precise crustal deformation.

In this study, we have also analyzed by the Virtual Reference Station Method (VRS-method) which is new trial of GPS data analysis in addition to conventional method. This new method uses the technique that produces virtual observations at any point by interpolating observations around that point. By this technique we can analyze objective line more accurately with L1 frequency.

We first evaluated the precision and confirmed the validity of analysis by VRS-method. Next, we applied this method to the Daisetsu mountain chain, which is our own GPS observation field, and had some discussions about the crustal deformation field of the mountain chain.

Analyzing by VRS-method, we obtained the precision which is about 10 mm with VRS produced by 5 reference stations 30-60 km far from each other and we confirmed important characteristics that the precision don't depend on the distance between VRS and observed point. About the discussion of deformation field in Daisetsu mountain chain, it is under going. Until the presentation we will show the annual deformation changes for 4 years and have some discussions about their results.

Since the distance between Omotedaisetsu and near Tokachi is more than 40 km, it was impossible to analyze using same L1 frequency. However, with this VRS-method we confirmed that we can consistently evaluate crustal deformation field in the Daisetsu mountain chain using L1 frequency.