Earth tide analysis using GPS

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Introduction

The lunisolar attraction is acting on the Earth and is producing the so-called Earth tides. The Earth tides are producing surface deformations of the Earth. This displacement field is response to the power source, which is controlled accurately. The observed the Earth tide, which is producing the accuracy controlled power source, may be called the kind of 'Active Monitoring'.

A great deal of effort has been made on the observed the Earth tides. What seems to be lacking, however, is spatial distribution of observation points. The gravity or strain observation can observe the Earth tides. However, they are very expensive and need the limited environment of observation places, where is low noise. It follows from what has been said that hard to observe the spatial heterogeneous of the Earth tides.

On the other hands, if we can observed the migrating crustal deformation due to earth tide by GEONET (GPS Earth Observation Network System) which GPS observation network consist of 1200 observation sites, operated by GSI (Geographical Survey Institute) in Japan, we can know the spatial heterogeneous response of the Earth tide field.

Analysis

In this study, PPP (Precise Point Positioning) was analyzed for 30 seconds sampling of RINEX file of about 1200 GPS continuousness observation points in the Japan Islands by GpsTools ver.0.6.3 software. We use the orbit information, which from IGS and the absolute and relative satellite clocks using IGS and COD, respectively. Our strategy of GPS analysis is the two days as a unit, and smoothly combines with unit and unit, which is overlap four hours. We estimate the spatial distribution of lag between observation data and the time series are calculated by GOTIC2.

Reference:

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