南極昭和基地における潮汐観測

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Tidal observation around Syowa Station, Antarctica

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For monitoring variations in the Antarctic geosphere, we have been performing some geodetic measurements such as VLBI, GPS DORIS, tide gauge, and superconducting gravimeter (SG), at/around Syowa Station. Some of these monitoring data involves tidal observables. The tide always deforms the geosphere periodically in wide frequency bands. To observe these tidal response of geosphere is then useful for understanding the internal physical properties of the Earth. Practically, a continuous observation of gravity responses to the tides with the SG has been conducted at Syowa Station since 1993. In Jan., 2010, we renewed SG at Syowa Station. After renewal, the obtained SG data achieved long-term stability and high quality without obvious instrumental drift and with the low noise. Such property enables to precisely observe the gravity response to the tides from seismic to long-periodic tidal bands. On the other hand, applying the presice point positioning (PPP) analysis, GPS can measure the 3D-displacements f geosphere attributed to the tides. We carried out the tidal analysis with BAYTAP to the 3D-displacements obtained from GPS as well as SG data. Comparing tidal factors of displacement with these of gravity response, we plan to discuss physical properties of the Earth at the period of 1/2 day to 180 days through the Love numbers.
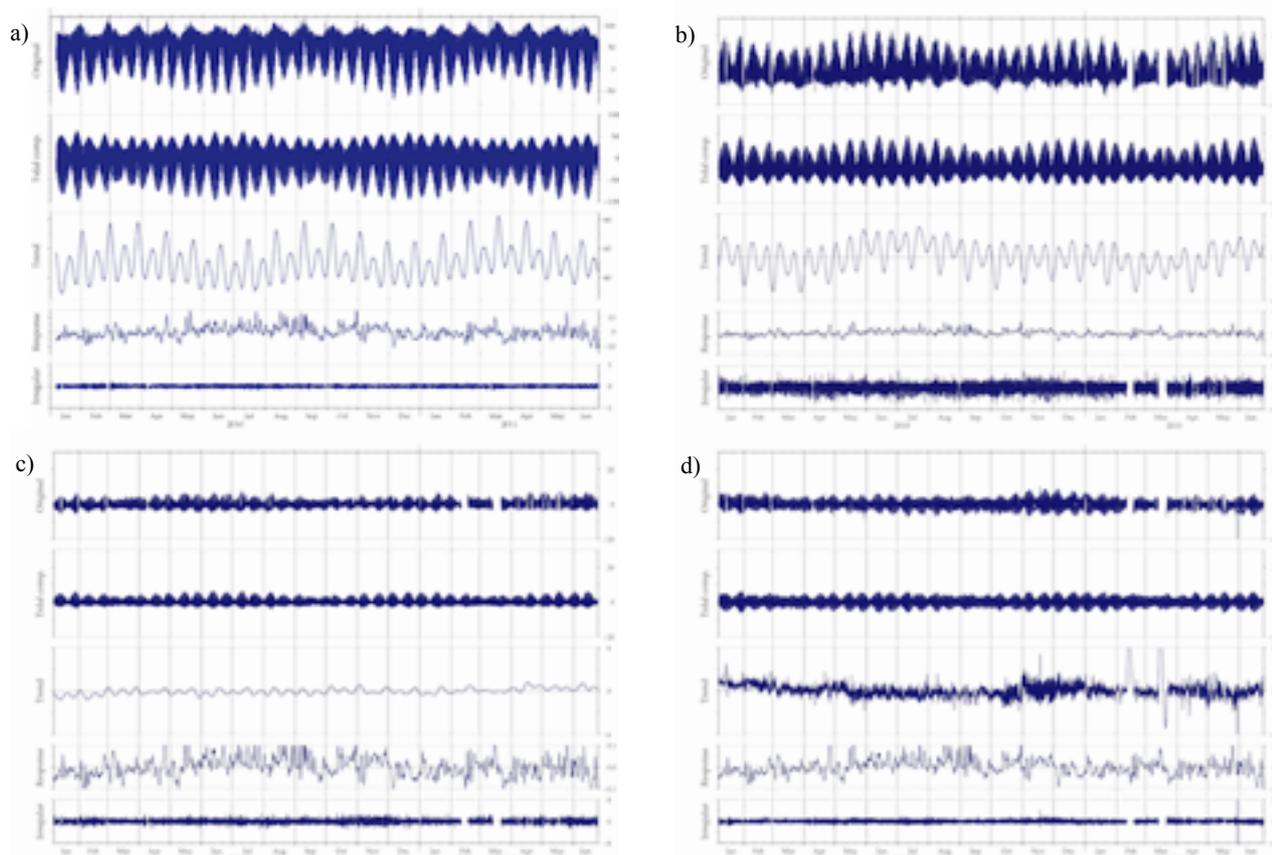

Figure 1. Results of tidal analysis at the period from 1/3 to 1 day with BAYTAP-G. "Original" means the observed gravity change or displacement. "trend" is the residual after removing the tidal and iregular components and the response of the atmospheric pressure changes from "original". a) Gravity response to the tides obtained from SG. Unit is μGal. b) Vertical displacement due to tides measured with GPS. Unit is cm. c) Northward displacement d) Eastward displacement