

## An attempt to improve the estimation accuracy of the atmospheric pressure effect based on the JMA Mesoscale atmospheric data

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As a cooperative observation of GGP-Japan, we are conducting the SG (Superconducting Gravimeter) observation at Kamioka (36.4N and 137.3E) since October 22 in 2004. One of main scientific targets of this observation is increasing the reliability of the detection of such weak signals originating from the Earth's core, by a cooperative observation with the SG at Matsushiro (about 80 km east from Kamioka).

As well known, a problem in the analysis of these weak signals is how we accurately estimate and correct the atmospheric pressure (A.P.) effects. Usually (or conventionally) the A.P. effects are corrected by using the local pressure data obtained at the observation site. However, it is not adequate only using the local pressure data to realize the correction at an accuracy better than 1 microGal.

To improve the estimation accuracy of the A.P. effects, we have tried a test computation using a fine pressure data so called as JMA-MANAL (Meso-scale Analysis) data (spatial resolution : 10 km by 10 km), which are provided by JMA (Japan Meteorological Agency) for the region around Japan (i.e. the area of 21.9N-44.1N and 107.5E-150.8E in the latitude and longitude, respectively).

Computation results, especially for the gravity, is sensitive to the accuracy of the surface pressure and the 3-Dimensional air mass distribution. We estimated the vertical profile of air mass distribution based on the equation of state of gas and the vertical profile of pressure (actually the geopotential height of the assigned pressure levels) and the temperature at each height. Moreover, to represent the surface topography as possible as precisely, we used three different kinds of topographic digital maps (DEM); three of KS110 of 0.5' by 0.75' provided by Geographical Survey Institute of Japan, ETOPO2 of 2' by 2' and DEM used in the JMA-GANLA (Global Analysis) data.

The present study clearly indicates efficiency of using such fine pressure data as the JMA-MANAL to improve the accuracy of the estimation of A.P. effects. From the comparison two data sets of the gravity residuals, i.e. one is obtained by BAYTAP-G tidal analysis taking into account the tides and the local pressure data and other is obtained by correcting the tidal components and the A.P. effects estimated using the meteorological data; we find, in the case of Kamioka, the correction only using the local pressure data does not well represent the effect of the pressure variations more than a few days in the period (i.e. the variations more than a few 100 km in the spatial scale). A remaining problem is how we include the frequency dependency of the IB response of the ocean into the convolution integral, as well as how we accurately interpolate the model data in the time-space domain, when we apply the correction values estimated using the model data to the analysis of high frequency phenomena shorter than 1 hour in period.