

Development of new geoid model of remote island of Japan

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Geospatial Information Authority of Japan released new geoid model of Japan, "GSIGEO2011", which consistency with survey results is greatly improved compared with the former model, covering all Japan islands except the remote islands, on April 2014. The GSI has developed new geoid model for the remote islands and this poster will report the result of the development.

The model has been developed for each islands by adjusting the latest gravity geoid model of Japan, "JGEOID2008", to fit actually measured geoid undulations, which are determined from the results of GNSS and leveling survey. The methods for the adjustments are : 1) bias method which expresses spatial distribution of differences between the measured geoid heights and JGEOID2008 (geoid undulation) as a single offset, 2) plane adjustment method which expresses distribution of geoid undulation in a simple inclined plane, 3) GMT method which expresses distribution of geoid undulation in a surface estimated by GMT green spline module. The most appropriate method is selected from the three methods depending on a number and density of input geoid undulations.

Almost all islands have their own height origin determined for each island. Therefore, in order to keep consistency with the height origin for the island, we have developed models for each island unless a distance between adjacent islands is too short to divide a model into two models.

Ellipsoidal heights of geoid undulation points, which are essential for calculating measured geoid heights, are recalculated if the heights were calculated before 2004 because all of ellipsoidal heights of GNSS-based control stations, which are used as reference stations for GNSS analysis, were recalculated on 2004. The consistency between ellipsoidal heights is improved by applying GNSS antenna phase center variation models which were created from calibration by the GSI.

Release of the new geoid model for the remote islands enables orthometric height determination by GNSS survey in a precision of third-order leveling over the nation including the remote islands. It is expected that this leads improvement in efficiency on survey work.

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