Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SGD23-P01 Room:Convention Hall Time:May 27 18:15-19:30

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.

Keywords: GSIGEO2011, geoid, survey results, remote island

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Improvement of the Gravity database of Kanazawa University

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The gravity database of Kanazawa University is now available on web (Honda et al., 2012, J. Geod. Soc. Japan). The terrain correction for the gravity data is based on Honda and Kono (2005, J. Geod. Soc. Japan) applying 50 m gridded topography data, which is based on various DEM, including sea data published by Japan Oceanographic Data Center, Japan Coast Gurad. Recently, 10 m DEM published by Ministry of Land, Infrastructure, Transport and Tourism is available, which covers all over the country. We refined our correction routine to apply the fine DEM. The terrain gravity correction, especially on mountainous region, improved by this application. We report our new correction routine with the refined gravity anomaly map.

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Keywords: Gravity Anomaly, Database

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Minus anomaly region of gravity in Hyuganada and place that sinking-slab-block tears off shallow part are corresponding

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(Please refer to the figure)

In convergence zones, high temperature bodies are formed diagonally-on-and-under the plate of low temp. and the bodies are drawn each other. The mantle wedge and the plate, get on the high temp. body that heads westward from the east, head westward. And, they are placed by the high temp. body that heads eastward from the west and compressed. I think this is the main spring and structure in it. I explained in each respect of the theory, experiment, and application.(1)(2)(3),etc.

This time, I thankfully used (4) to be able to understand tomography data of 3D in seamless. And I thankfully used (5) about gravity chart(Bouguer anomaly). I have been interested in the existence of minus anomaly region of gravity where with center in Hyuganada(5). Result of the research is going out and I want to report. (the minus anomaly region of gravity:The Region)

The Region is divided roughly into the one in prefecture northern part and the prefectural boundary, and the one in Hyuganada. The latter has the plain center like eye and the long-drawn tail to the south and is impressive. The south end of ,the subducting slab(The SS), is exactly formed in the eye. Pulling Hot1 and Hot2 against each other is shown by black pair arrows in each Section. (Names of high temp. bodies, etc. are naming only of here.) Bearing capacity of land and intrusive pressure generated along with it are shown by pink arrows.

In Section 1-1',2-2', Hot1 invades under the land to the east to be deep and is pulled against each other again there with Hot2. The black arrows are mainsprings that wring and dent or thin The SS. Pressure in the invaded part rises and The SS is depressed(blue arrow). And the invaded part extends vertically. By the result of this calculation of going out and entering of density, The Region in the prefecture northern part and the prefectural boundary might exist.

It is thought that the sinking-block is formed and separates from The SS by the above-mentioned action. On the west side, it is divided into parts from the depth in the west due to the crack(blue broken line) and slips. On the east side, tightening and pull-tearing off(green arrow) are generated in shallow area(Hyuganada). Vertical subsidence of the sinking-block is understood underground in the whole area of Miyazaki Prefecture. Section 1-1'–9-9' are like fixed point scene sending animated cartoon of this change.

The site of pull-tearing off and separation(The Site) is in the Miyazaki Prefecture central part offing and is corresponding to the peak of The Region(Section 4-4'–7-7',a-a'). By pull-tearing off action, for hanging down part of The Site, the material is pulled out under the west, the shape is transformed into Rohto type. And, I think that the generation of the density reduction is a cause of the gravity anomaly. End of pull-tearing off and complete separation have already been generated in the southern part(Section 8-8',9-9'). However, the place is still in The Region and the tail expands to the south. The peak of the gravity anomaly came like the shadow along with The Site that keeps going north from the south and arrives now. Even if The Site passes, the gravity anomaly of the place remains as a track (tail) because it does not improve at once.

(1)Mase/SSJ2010/P3-47 (2)Mase/JpGU2012/SCG67-P06 (3)Mase/SSJ2014/S03-P01
(4)AIST/Visualization system for subsurface structures/tomography data by Abdelwahed and Zhao (2007)dVp
(5)AIST/same to (4)/gravity chart(Bouguer anomaly)