Development of marine geoid model around Japan-Part 2-

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In last meeting, we reported about 'Marine Geoid Model' and accuracy as the title 'Development of marine geoid model around Japan' and 'Evaluation of sea surface dynamic height with new marine geoid model and TOPEX/POSEIDON altimeter data' In this 2007 meeting, we changed the used data and method for calculating the geoid model. Consequently, the accuracy of a model has been improved, and we report again about Marine Geoid Model around Japan.

About used data, although geoid was analyzed by the 'remove-restore' method, we changed CG03 into GGM02 as a long wavelength component, and changed altimeter gravity data Sandwell V11.1 into V15.1 which was interpolated to the lack area of ship-borne gravity data as a short wavelength component.

About the analysis method, in COE (Cross Over Error) compensation of ship-borne gravity data, (1) we calculated only using the data (called GPS data) observed by the GPS equipping vessels of Hydrographic and Oceanographic Department (called H.O.D.). Next, (2) we calculated using GPS data, except it and observed by organizations other than H.O.D.. In processing of (2) total, we compensated C.O.E. fixing (1) GPS data, GPS data was used as the reference of (2).

Furthermore, the reference of altimeter gravity Sandwell V15.1 was EGM96, and since it differed from the reference GGM02 of Marine Geoid Model, we performed to adjust this difference. GGM02C used for this model is spherical harmonic coefficients set to degree/order 200 which combined the data of GRACE, and the earth surface observation data. And GGM02C is constrained the higher degrees to the harmonic coefficients of EGM96, this GGM can be used as the set to degree and order 360 by using the EGM96 coefficients to fill in above degree and order 200. For this reason, we removed the gravity of EGM96 from altimeter gravity to degree and order 200, and added GGM02C (to degree and order 200) to it.

The evaluation of the marine part of geoid model is the method to Compare SSDH (Sea Surface Dynamic Height henceforth) with CTD data and that with altimeter SSH (Sea Surface Height) and geoid model like the 2006 meeting. The accuracy of the re-analyzed geoid model improved from the last one, and the two SSDH(s) mentioned above show good correlation. About the result, the correlation graph and profile of SSDH etc. are presented at the meeting.

Moreover, we calculated the geostrophic current using the altimeter SSH of AVISO (Archiving Validating and interpretation of Satellite Oceanographic data) in France. The supported data is the SLA (Sea Level Anomaly) from the model (CLS01) of mean sea surface, in the case of mesh data (minimum mesh : 15 minute). For this reason this SLA data converted to the ellipsoid height of GRS80 adding CLS01 to SLA. For example, we calculated the geostrophic current on May 11, 2005, when the Kuroshio current was a large meander. As the result, geostrophic current agreed mostly with the axis of Quick Bulletin of Ocean Conditions by H.O.D.. The vector map of geostrophic current is presented at the meeting, too.