D107-003 **Room: 304** **Time: May 20 14:15-14:30**

Viscosity of the upper mantle in Southeast Alaska

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Southeastern Alaska (SE-AK) shows very rapid uplift rates exceeding 30 mm/yr in maximum, which are considered to be mainly caused by glacial isostatic adjustment (GIA) processes related to the last glacier maximum (LGM), the little lice age (LIA) and the present-day ice (Larsen et al., 2004 and 2005). Precise estimation of the present-day ice melting (PDIM) effects is important to study the effects of the past ices (for example, Sato et al., 2006). Here, we reexamine the effects of PDIM and the viscosity value at the most upper layer of the upper mantle beneath the SE-AK by comparing the computed uplift rates with the observed GPS data at 91 sites of UAF, PBO and ISEA project (Miura et al., 2007).

For the PDIM effects, we compared two ice-rate data sets called here EPSL2005 and JGR2007. The former is the ice rate data based on Arendt et al. (2002), which is for the period of about 40 years from the mid-1950s to the mid-1990s. The later is a data set compiled by Larsen et al. (2007), which is obtained from differencing two DEMs of the 2000 Shuttle Radar Topography Mission and the USGS NED DEM based on air photos dating from 1948 to 1987. The data used here are those averaged over the grid of 0.083 deg by 0.042 deg of the sizes in the directions of longitude and the latitude, respectively.

According to the Green's function method (Farrell, 1972), we estimated the PDIM effects at each GPS site. The Green's functions were computed using the load Love numbers for the PREM model up to the order of 10,000 in the order of spherical harmonics. The effects of LIA were computed based on the spatial-time variation data given in the EPSL 2005 paper. The computations were carried out using a computer code called 'TABOO' (Sapada, 2003). The maximum spherical harmonics was up to 1024 in the order.

For the viscosity, we searched its optimum value by changing within the range of 1.E+17 to 5.E+19 Pa s and by comparing the standard deviations (SDs) of the differences of the observations to the computed LIA effects (Case 1) and those of the differences considered not only the LIA but also the PDIM (Case 2). Therefore, we expect that the optimum value for viscosity shall be given at the minimum SD. Although the comparisons here are primitive one, because we tested the computation of LIA effects only for the case of 50 km of the thickness of the lithosphere and we need to examine the effect of errors in the GPS observations, the comparison results indicate;

(1) For the PDIM effects, two data sets of EPSL2005 and JGR2007 give similar spatial uplift patterns that have two peaks at Yakutat and Glacier Bay, respectively. However, a clear difference between two models is observed near the Muir Glacier, which has experienced a very rapid retreat since 1900s and the most of the ice in the low land there has already melted now.

(2) Compared Case 1 with Case 2, we observe a tendency that the magnitude of the SD of Case 2 is smaller than that of Case 1. This suggests that the PDIM effect should be considered to explain the observed uplift rates. More over, the optimum viscosity value estimated from Case 1 is smaller in magnitude than that from Case 2.

(3) Among the 4 cases compared here, the magnitude of SD of Case 2 with the PDIM effects estimated from JGR2007 is smallest. The viscosity value suggested from the minimum SD is not so different between two cases of Case 2 with EPSL2005 and with JGR2007. Both give a value of about 2.E+19 Pa s which is about one order larger than that shown in the EPSL 2005 paper, suggesting that the estimation of PDIM effect of the EPSL 2005 paper might be smaller than that actually observed.

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