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Cooperative observation of superconducting gravimeters at Kamioka and Matsushiro in Japan

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Observation of eigenmodes of the Earth's core (i.e. the fluid outer core and the solid inner cores) should give us important information of its density structure. Among the eigenmodes, the translational mode of the inner core, so called Slichter mode (1961) estimated as 3-8 hours in period, contributes to constrain the density structure inside the core, if it can be observed precisely. High resolution and low noise level of superconducting gravimeters (SGs) at frequencies less than 1 mHz range are expected to allow us to detect this mode. However, opinions opposed to each other concerning the detection of this mode with the SGs. One of the reasons is the weakness of its amplitude as suggested from the theory. To improve the reliability of the observation, we have started the SG observation on October 2004 at Kamioka in Japan, which locates at a place of about 30 km west from the Matsushiro SG site in horizontal distance. To improve the accuracy of the correction for the air pressure changes and to reduce the noise level of the SG data analysis, we have also developed a local pressure gauge network consisting of 8 sites including the two SG sites, which are about 100 km in spatial extent. We introduce here: (1) the observation system, (2) the comparison of the noise level between two sites and (3) the preliminary analysis results for the spatial distribution of air pressure changes between a few minutes to days in period.

Reference:

Slichter, L.B., 1961, The fundamental free mode of the Earth's inner core, Proc. Nat. Acad. Sci., 47(2), 186-190.