

The core-mode of 2S2 (1055 s) excited by the 2004 great Sumatra-Andaman earthquake

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S wave velocities in the inner core were estimated by eigenfrequencies of long period free oscillations in 1960s to 1970s. However, they have little oscillation energy in the inner core and thus resolutions of the S wave velocities were poor. Our research target is to detect spectral signals of the seismic core mode 2S2 (around 1055 s), whose oscillation energy is mostly confined to the inner core. However, its surface amplitudes predicted for the Mw8 class earthquakes are orders of $10^{(-8)}$ m/s, $10^{(-10)}$ m/s² and $10^{(-12)}$ strain, less than detectability of broadband seismometers, SCG and strainmeters. In 2004, the Great Sumatra-Andaman earthquake of Mw9.0 occurred. The expected amplitude of the 2S2 is 1 or 2 orders larger than those for Mw8 class earthquakes and thus would be over the detectability. Moreover, the earthquake has enable us to compute spectra of 25 day length records, leading a sufficient spectral resolution of 0.0005 mHz to separate the spectral peak of 2S2 (0.948mHz) from those of 1S3 (0.9399mHz) and 3S1 (0.9451mHz).

Looking over webs of F-net in Japan, IRIS/IDA and GGP, we have uninterrupted records for around 25 days after the earthquake only at 8 stations of F-net, no station of IRIS/IDA, and 6 stations of GGP. Computing FFT and Sompi spectra of the 25 day long seismic records starting 6 hours, 9 hours and 12 hours after the earthquake, we obtain decaying spectral peaks corresponding to 2S2, 1S3 and 3S1, leading estimates of Q of 400-700 for 2S2, 600-1000 for 1S3 and 600-900 for 3S1, while they are unknown, 283 and 827 in PREM (Dziewonski and Anderson, 1981). The Peak amplitude of 2S2 is one order smaller than those of 1S3 and 3S1, as predicted for PREM. The eigenfrequency of 0.9475 mHz with the Q of 400-1000 of 2S2 leads to the eigenperiod of 1050-1045 s at the reference period of 1 s. This preliminary result suggests a possibility that overall S wave velocity in the inner core is by 0.5-1.0 % smaller than that of PREM.