Surface-amplitude variations of 0S0 observed and predicted after the 2004 Sumatra-Andaman earthquake

Severine Rosat[1]; Shingo Watada[2]; Tadahiro Sato[3]

[1] Mizusawa, NAO; [2] Earthquake Research Insititute, U. of Tokyo; [3] NAO

Superconducting gravimeters (SGs) data of the Global Geodynamics Project (GGP) have widely demonstrated their capabilities to analyze the normal seismic modes of the Earth at frequencies less than 1 mHz. The recent Mw = 9.3 Sumatra-Andaman earthquake on 2004 December 26th has strongly excited the low-frequency seismic modes and, in particular, the fundamental radial mode 0S0. 0S0 is called the breathing mode of the Earth as it corresponds to almost a pure compression and dilatation of the Earth with a PREM period of 20.5 minutes. With a theoretical quality factor Q of 5327 for PREM, 0S0 is the only seismic mode to damp so slowly. We have analyzed 11 time-varying gravity data recorded on the Earth's surface by the SGs installed at Canberra (Australia), Sutherland (South Africa), Matsushiro (Japan), Kamioka (Japan), Medicina (Italy), Vienna (Austria), Wettzell (Germany), Bad-Homburg (Germany), Moxa (Germany), Strasbourg (France) and Ny-Alesund (Norway). The accurate calibration of SGs (usually less than 0.2%) enables us to discuss the amplitude of the seismic mode 0S0. The observed amplitude pattern of 0S0 on the Earth's surface reveals a latitude dependency that is confirmed by theoretical predictions for a realistic elliptic rotating laterally heterogeneous Earth model. 0S0 amplitude is 2% higher at the poles than at the equator. The differences between the observations and the predictions at SG sites enable us to put some constraints on the lateral heterogeneities inside the Earth.