

Feeling the heartbeat of the Earth?

The Earth's inner core grows from the solidification of the outer core. The growing of the inner core releases latent heat and dispels light elements, providing driving forces for the outer core convection and power for generating geodynamo. The inner core growing process is thought to be geologically slow and geographically uniform because of the presumed small temperature variation in the outer core. Knowledge of the seismic structures of the inner core (anisotropy, velocity and attenuation), their lateral variations and temporal change is essential to our understanding of dynamics and growth of the inner core. In this presentation, I first review some latest results on the seismic properties of the inner core, including hemispherical variations of velocity, attenuation and anisotropy in the top of the inner core. I then present seismic observations and analysis related to temporal change of the inner core boundary. Seismic observations from an earthquake doublet (two events occurring in South Sandwich on 12/01/1993 and 09/06/2003), show that compressional waves, recorded at three seismic stations in Russia and Kyrgyzstan and reflected off Earth's inner core boundary, arrive at least from 39 to 70 milliseconds earlier in the 2003 event than in the 1993 event. Such changes indicate that the Earth's inner core radius enlarge locally beneath middle Africa by 0.98 to 1.75 km between these occurring times of the doublet. I will further discuss possible interpretations and implications of such temporal change of the inner core boundary.