Geophysical Research Abstracts
Vol. 18, EGU2016-3883, 2016
EGU General Assembly 2016

Detectability of temporal changes in fine structures near the inner core boundary beneath the eastern hemisphere

Wen-che Yu

Academia Sinica, Institute of Earth Sciences, Taipei, Taiwan (fgsyw@earth.sinica.edu.tw)

The inner core boundary (ICB), where melting and solidification of the core occur, plays a crucial role in the dynamics of the Earth's interior. To probe temporal changes near the ICB beneath the eastern hemisphere, I analyze differential times of PKiKP (dt(PKiKP)), double differential times of PKiKP–PKPdf, and PKiKP coda waves from repeating earthquakes in the Southwest Pacific subduction zones. Most PKiKP differential times are within $\pm$30 ms, comparable to inherent travel time uncertainties due to inter-event separations, and suggest no systematic changes as a function of calendar time. Double differential times measured between PKiKP codas and PKiKP main phases show promising temporal changes, with absolute values of time shifts of >50 ms for some observations. However, there are discrepancies among results from different seismographs in the same calendar time window. Negligible changes in PKiKP times, combined with changes in PKiKP coda wave times on 5 year timescales, favor a smooth inner core boundary with fine-scale structures present in the upper inner core. Differential times of PKiKP can be interpreted in the context of either melting based on translational convection, or growth based on thermochemical mantle–inner core coupling. Small dt(PKiKP) values with inherent uncertainties do not have sufficient resolution to distinguish the resultant longitudinal (melting) and latitudinal (growth) dependencies predicted on the basis of the two models on 5 year timescales.