



Inner core tomography around the African hemisphere boundary region

Jessica Irving

Princeton University, Department of Geosciences, Princeton, United States (jirving@princeton.edu)

The inner core's hemispherical dichotomy - a variation in inner core properties between the 'eastern' and 'western' hemispheres of the inner core - has been observed by a number of researchers over the past eighteen years, but there is not yet a consensus over the exact nature of the hemisphere boundary region under Africa. The location of this boundary has been proposed to be at lines of constant longitude which vary by more than forty degrees. In reality a line of constant longitude is likely to be much too simplistic to describe the variation in seismic properties across the inner core. Both latitudinal and depth variation of the hemisphere boundaries have been suggested. When hemispherical structure was first observed, there were limited data available to interrogate the inner core under Africa, Europe and the southern Atlantic and Indian Oceans. With the expansion of seismic networks worldwide, many more data which sample this region are now available.

Here, I use a new dataset of around 2000 PKPbc-PKPdf differential travel time measurements to probe the African hemisphere boundary region. The use of PKPbc as a reference phase allows for the measurement of differential, not absolute travel times, which reduces the influence of crust and mantle structure on the observations. The PKPdf rays turn up to 360km below the inner core boundary and have a range of angles to Earth's rotation axis, allowing them to exhibit sensitivity to both isotropic and anisotropic velocity anomalies. Travel time tomography is used to image variations in the inner core close to proposed locations of the hemisphere boundary, with the crossing ray paths present in the dataset being exploited to find the regional variations in velocity for both polar and equatorial paths.