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# 3D Transdimensional Seismic Tomography of the Inner Core

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The inner core contains strong seismic heterogeneity, both laterally and from the surface to the centre. Accurately resolving the seismic structure of the inner core is key to unravelling the evolution of the core. Seismic models of inner core structure are often limited by their parameterization, which means it is difficult to interpret which features of the inner core are real (e.g. hemispheres or the inner most inner core). To overcome this we conduct seismic tomography using transdimensional inversion on a high quality data set of 5296 differential and 2344 absolute P-wave travel times. By taking a transdimensional approach we allow the data to define how the model space is parameterized and this provides us with both the mean structure of the inner core but also the probability distributions of each model parameter. This allows us to identify which regions of the model space are well constrained and likewise which regions are poorly constrained. We compare results from a static MCMC model and a transdimensional MCMC model, this provides confidence in our results as both models show clear similarities in structure. From no prior assumptions on inner core structure we recover many first order observations: such as anisotropic hemispheres and an isotropic outer inner core (OIC) along with potential observations of an inner most inner core. With higher resolution than previous inner core tomography we can provide more detailed interpretation of inner core structure and draw conclusions with greater confidence. We also conduct transdimensional inversions on a subset of our data which does not contain South Sandwich Islands (SSI) events which are considered by many to be unreliable or contaminated with mantle structure. The overall inner core structure remains largely the same however, showing that the SSI data does not significantly alter our final interpretations.