Search for lateral variation in the Earth's outermost core by using a global data set of SmKS waveforms

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Possibility of lateral variation in the Earth's outermost core is examined. A bootsrap waveform modeling (Tanaka, 2005 at SSJ Fall Meeting) is applied to regional data sets that are selected from a global data consisting of approximately 1200 SmKS waveforms. The initial model is PREM with variation ranges of 7.80 to 8.20 km/s for the P-wave velocity at the core top and of 20 to 160 km for the layer thickness. I tested the polar cap region of which latitude is greater than or equal to 45 degree (411 traces) and 4 regions of the central Atlantic (Region 1; 174 traces), northeastern Pacific (Region 2; 259 traces), eastern Eurasia (Region 3; 402 traces), and the Indian Ocean (Region 4; 190 traces). SKKS bounce points under the CMB are used for the data selection. Solutions for the outside of each selected region support the existence of a low velocity layer in the outermost 80-100 km in the core with small scattering as same as that obtained from the global data. However, in the polar cap and Region 1 and 2, two possible solutions were appeared. One is a low velocity layer similar to the global solution, another is a very thin (20 km thick) high velocity layer that is the border of the searching space. In Region 4, solutions of thin velocity layers are dominant. The high-V structure is similar to that obtained by Eaton and Kendall (2006) who analyze the Canadian broadband seismic array. Unfortunately, model resolutions for the selected regions were worse than that obtained by a whole global data because that trace number and coverage of epicentral distace were quite poor. At the present time, it is difficult to conclude that the thin high velocity layer is a manifestation of a regional difference, this structure is regarded as an artifact, because the grid-search results for small regional data sets are highly instable.