



The velocity structure of the core constrained by joint analysis of differential travel times and differential ray parameters of PKP(BC)-PKP(DF)

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The differential travel time measurements of PKP(BC)-PKP(DF) are widely used for studying the core velocity structure. The basic assumption of this approach is that the ray paths of both core phases are similar in the mantle and outer core. In this study, we used the differential ray parameters of two core phases to give more constraints on the velocity structure of the core. The very dense seismic network in Japan (Hi-net) makes the precise measurements of differential ray parameters of PKP(BC)-PKP(DF) for broad epicentral ranges possible. Measured differential travel times and differential ray parameters clearly show the hemispheric variations which have been reported in many previous studies. For both hemisphere, the trends of differential ray parameter change at certain epicentral distances. In addition, the epicentral distances where changes occur are different for eastern and western hemispheres. This observation indicates that there should be changes in velocity gradient in the inner or outer core. We constructed many 1D velocity models by modifying PREM and tried to match the synthetic differential travel times and ray parameters with observations. Our preliminary results show that the simple way to explain the change in trend of differential ray parameters is to put the layer with very gentle (nearly zero) velocity gradient at the base of the outer core. In addition, the hemispheric variations in the epicentral distances where changes occur can be explained by the variations in the thickness of given layer.