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# 大規模アレイで観測された SmKS 波を用いた外核最上部の P 波速度構造
# Outermost core Vp derived from analyzing SmKS waves observed at large scale arrays

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The Earth's core is composed primarily of iron with several per cents by weight of lighter elements. The lighter elements are thought to be progressively enriched in the outer liquid core as the core cools and the inner core crystallizes. In this study we present evidence for compositional layering in the outermost part of the core based on the analyses of travel times and wave forms of SmKS multiple. Large scale broadband seismometer array data of SmKS waves with m up to 5 are analyzed to investigate the depth profile of P wave speed (Vp) of the outermost core. We apply a tau-p inversion to the SmKS data and show that Vp is 0.35% slower at the CMB than PREM and the lower Vp anomaly gradually diminishes to zero at 300 km below the CMB. The SmKS differential travel times clearly indicates that there must be a significant difference in the radial gradient of Vp between the outermost 300 km of the core and the deeper part of the core, but the obtained Vp anomaly is less pronounced than the 1 to 2 % reductions in a thinner layer suggested by previous seismological studies. The evaluation of Bullen's parameter for the obtained Vp profile shows that adiabatic self compression of a homogeneous material cannot explain the observation and that some form of compositional anomaly is required. The compositional layering at the outermost outer core may indicate the presence of sub-adiabatic temperature gradients, which means that the thermal effects on density are augmented by compositional effects.

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