

# AOB & COE Seminar

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*Title: Constraints on core composition  
from liquid immiscibility*

Research Center for Prediction of Earthquakes and Volcanic Eruptions  
August 30, 2005 (The) 14:00-16:00  
Lecture Room #1 (AOB annex )

## Abstract :

The Earth's core is composed primarily of Fe with about 10% by weight of lighter elements. The lighter elements are progressively enriched in the outer liquid core as the core cools and the inner core crystallizes. Thermodynamic modeling of Fe-O-S liquids shows that immiscible liquids can exist at outer core pressures (136 to 330 GPa) at temperatures less than 5200 K and lead to layering in the outer core if the concentrations of the lighter elements are high enough. We find no evidence for layering in the travel times and waveforms of seismic waves that reflect internally in the core, P4KP. The absence of layers therefore constrains outer core compositions in the Fe-O-S system to be no richer than  $6 \pm 1$  wt.% O and 2-15 wt.% S. A single core liquid composition of  $10.5 \pm 3.5$  wt.% S and  $1.5 \pm 1.5$  wt.% O is compatible with wavespeeds and densities throughout the outer core.

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