

Institut für Geophysik
Geophysikalisches Kolloquium
Sommersemester 2024

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Kilometre-scale structure at the core-mantle boundary

Earth's core-mantle boundary (CMB) is a dynamic location; this interface separates the solid silicate mantle and the liquid iron outer core, which are both convecting systems with vastly different physical properties. A range of processes occur in this region including subducted slabs and plumes bringing and removing material, respectively. There are likely also more complex processes, including phase changes, localised or widespread (partial) melting, and chemical reactions or exchange between the core and mantle. The density increase at the CMB exceeds 4000 kg/m^3 , and this raises the possibility that a wide range of materials could remain gravitationally stable at the CMB on geologic timescales.

In recent years, seismologists have detected many small ultra-low velocity zones (ULVZs) sitting atop the CMB. While different studies favour different formation mechanisms, it is likely that ULVZ are seismically-visible manifestation of this trapped material. ULVZs may be discrete features, or they may be local thickenings of a global layer of low seismic velocity that is too thin elsewhere to have been robustly detected thus far. A global conductive layer, compatible with this latter scenario, is supported by geomagnetic constraints. Here we test the visibility of a kilometre-scale basal layer to seismic data of different frequencies, including short-period diffracted waves and normal modes. We find that the existence of a globally distributed layer 1-3 km thick that is seismically slow and dense is compatible with all the seismic data and other geophysical observables.

Das Kolloquium findet um 16:00 Uhr im Seminarraum GEO 315, Corrensstr. 24, 48149 Münster statt. Alle an dem Thema Interessierten sind hierzu herzlich eingeladen.

Die Dozenten des Instituts für Geophysik