

Institut für Geophysik

Geophysikalisches Kolloquium  
Wintersemester 2018/2019

Montag, 7. Januar 2019

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## **Exploring small-scale heterogeneities in the lowermost mantle using PKP precursors**

Small-scale heterogeneities in the lower mantle can scatter seismic energy that can be observed as precursor to PKP phases. Global observations indicate that these scattering heterogeneities could be on the scale of  $\sim 10$  km with  $\sim 0.1\%$  velocity variations in the deep mantle. Scattering could result from seismic heterogeneities (e.g., remnants of ancient subducted slabs, melt pockets or ultralow velocity zones) and/or CMB topography. However, the primary source of these small-scale heterogeneities and relationships with seismic structures remain elusive. Here we investigate regional variations in precursor amplitude to aid the interpretation of the source of scattering. For one specific path, we collect PKP precursor waveforms from earthquakes in South America which are recorded by seismic arrays in Australia. By analysing the slowness and scatterer location, we obtain the spatial distribution of these scatterers in the lowermost mantle east of Pacific LLSVP. We further constrain the velocity variations of these strong seismic anomalies using waveform modelling. These strong seismic scatterers could be interpreted as localized, patchy ULVZs, with P-wave velocity reductions of  $\sim 3\text{--}10\%$  and thickness of several tens of kilometers. The dimension of the ULVZs suggest that these ULVZs are mainly due to compositionally distinct heterogeneities, although partial melting cannot be completely ruled out. To extend the coverage of precursor observations, we now examine a global data set of PKP precursors to better constrain scattering magnitudes and sources of scattering. We separated the dataset into coherent and incoherent precursors which might help to understand causes for the scattering. We find strong variations of scattering amplitudes in many different paths. This helps to determine the relationship between regional variations in scattering amplitudes and seismic structures in the lowermost mantle.

Das Kolloquium findet um **16 Uhr c. t.** im **Seminarraum GEO 315**, Corrensstr. 24, 48149 Münster statt.

Alle an dem Thema Interessierten sind hierzu herzlich eingeladen.

Die Dozenten des Instituts für Geophysik