

Scattering and reflections in the lowermost mantle beneath the Caribbean and South Atlantic

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The D'' region is characterized by a variety of structures at many different scales, ranging from small-scale scatterers and ultra-low velocity zones with up to 10's of km-sizes to the large-low shear velocity provinces beneath the Atlantic and Pacific. Another prominent structure is the D'' reflector that has been found in many regions.

The focus of this study is on the lowermost mantle where scattering of the PKP phase occurs which arrives as precursors to PKP_{df}. Here the area of interest is the region of and around the Caribbean Sea and Atlantic. To investigate the structure in the lowermost mantle below this region, events in Central and South America from 1991 to 2017 are used with a magnitude of 6 and greater in a depth below 100 km. The data are recorded at stations in a distance of about 120 to 145°, as for example the Kyrgyz Seismic Telemetry Network (KN).

The scattered and diffracted waves in the seismograms are studied in different frequencies to look for changes in amplitude ratios of precursors to PKP_{df} with regard to frequency, direction and distances. We find that precursors to PKP_{df} show a dependency of amplitude with frequency and epicentral distance. In addition the arrival time of precursors shows a frequency and distance dependency, as well. We also test directional dependencies of scattering to test whether scattering could be anisotropic. Beside scattering we also investigate the D'' reflector in this region. This reflector has been observed before but we now examine it with different frequencies and test for amplitude and travel time dependency on frequency.