

The unexplored potential impact of pyroxenitic layering on upper mantle seismic properties

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It is now accepted that significant volumes of pyroxenites are generated in the subduction factory and remain trapped in the mantle. In ophiolites and orogenic massifs the geometry of pyroxenite layers and their relationships with the host peridotite can be observed directly. Since a large part of what is known about the upper mantle structure is derived from the analysis of seismic waves, it is crucial to integrate pyroxenites in the interpretations. We modeled the seismic properties of a peridotitic mantle rich in pyroxenite layers in order to determine the impact of layering on the seismic properties. To do so, EBSD data on deformed and undeformed pyroxenites from the Cabo Ortegal complex (Spain) and the Trinity ophiolite (California, USA) respectively are combined with either A or B-type olivine fabrics in order to model a realistic pyroxenite-rich upper mantle. Consideration of pyroxenite-rich domains within the host mantle wall rock is incorporated in the calculations using the Schoenberg and Muir group theory [1]. This quantification reveals the complex dependence of the seismic signal on the deformational state and relative abundance of each mineral phase. The incorporation of pyroxenites properties into geophysical interpretations in understanding the lithospheric structure of subduction zones will lead to more geologically realistic models.

[1] Schoenberg and Muir (1989) *Geophysics* **54**, 581-589.