Seismic anisotropy as a tool to understand oceanic-continental plate interactions

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Earth's thermal evolution is co-determined by the dynamics of continuously recycled oceanic and more persistent continental plates. The interactions between subducting slabs and strong continental cratons within the upper mantle are examples of such processes. Here, I discuss two regional examples from recent collaborative work, where structural seismology, mineral physics, and mantle geodynamics can be combined to obtain a better understanding of the key parameters involved in crustal and mantle flow, such as the relative strength of sub-oceanic plate asthenosphere and slabs. One case study is for the Caribbean plate and the northern margin of South America, the other for the Atlas-Alboran domain of the western Mediterranean where USC was involved in a large scale experiment over the last years. In both settings, observations of seismic anisotropy can be shown to be powerful constraints on upper mantle dynamics, if regional settings are embedded in global numerical models with high resolution. Our large scale forward computations allow us to approach tectonic problems in data rich environments with an applied, inverse geodynamics approach.