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Seismic anisotropy of the Central Andean subduction zone derived from shear-wave splitting

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The occurrence of seismic anisotropy is usually explained by the preferred alignment of anisotropic crystals, e.g. olivine, due to asthenospheric mantle flow or frozen-in lithospheric anisotropy in relation to previous tectonic events. In subduction zones anisotropy is often found to be dominated by fast-polarisation axes oriented sub-parallel to the trench. This has led to the hypothesis of trench-parallel mantle flow due to pressure gradients induced by slab geometry and trench migration. However, the character of the mantle-flow field in subduction zones remains poorly understood.

We investigate shear-wave splitting along two profiles in the Central Andes at 21° S and 25.5° S in the downdip direction of the subducting Nazca plate in order to clarify variations of the fast splitting directions and the delay times from the Pacific coast to the West. Using both, teleseismic SKS and local S phases, we aim to discriminate between effects of the crust/mantle wedge above and asthenospheric flow beneath the slab. First results of fast polarisations from SKS phases show a significant variability over relatively short distances along the northern profile and delay times ranging from 0.5 to 1.5 sec. We discuss our results in view of the recently derived dependence of olivine-crystal alignment on pressure and water content.