Geophysical Research Abstracts, Vol. 7, 03041, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03041

Spatial variation of seismic anisotropy in the deep part of the Tonga subduction zone

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The deep part of the Tonga subduction zone consists of two differently oriented slab segments: the northern segment within latitudes 17-19°S, and the southern segment within latitudes 19.5-27°S. The orientation of the slab is (strike/dip): 110°/57° in its northern part and 210°/46° in its southern part. The inversion for anisotropy from non-double-couple components of moment tensors of deep earthquakes points to orthorhombic anisotropy in the both parts of the slab. The anisotropy has a uniform strength of 5-7% for P waves and 9-12% for S waves. The anisotropy is oriented according to the orientation of each slab segment and the stress acting in it. The spatial variation of velocities is roughly similar in both parts of the slab. The anisotropy in the slab is probably caused by anisotropic minerals such as wadsleyite, ringwoodite or others which are aligned under the stress acting in the slab. The properties of anisotropy can serve as an additional constraint on the structure and mineralogical composition of the slab.