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Anisotropy beneath the Southern Pacific - real or apparent?

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Anisotropy of the lowermost mantle beneath the South- to Central Pacific is investigated using US-Array receivers and events located near the Tonga-Fiji subduction zones. Differential splitting in three different distance ranges (65˚-85˚, 90˚-110˚ and >110˚) of S-ScS, SKS-S, SKS-Sdiff phases is used. By utilizing differential splitting technique, it was possible to correct for upper mantle, as well as source- and receiver side anisotropy and effectively quantify shear wave splitting originating in the lowermost mantle. Delay times of horizontal (SH) and vertical polarized (SV) shear waves show that predominantly the SH wave is delayed relative to the SV wave. Motivated by the discrepancy in previous Pacific studies investigating the lowermost mantle beneath the Pacific the possibility of isotropic structure producing the observed splitting is tested. Synthetic seismograms are computed, based on various isotropic models and the resulting synthetics are analysed in the same way as the real data. While simple layered models do not produce splitting and therefore apparent anisotropy, models in which the lowermost mantle is represented as a negative gradient in P- and S-wave velocity, produce clear apparent anisotropy. Thus, this study presents a possible alternative way of explaining the structure of the D” region.