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# A comparison of GPS solutions for strain and SKS fast directions: Implications for modes of shear in the mantle of a plate boundary zone

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We study the strain rate field computed using the GPS GEONET dataset collected during the last decade. We show that we can infer the amount of simple shear accumulated in the mantle by comparing the compression strain orientation with the SKS fast directions. We suggest the mantle beneath the southern part of the south island is under pure shear while to the north the amount of distributed shear is larger. At last, we confirm that, in that context, the strike of New Zealand fault systems make a 60 degree angle with the compression strain rate axis.
We compute the strain rate field and the vectors for the principal axis of strain in within New Zealand based on 10 years of data from the Geonet network. A comparison of the principal axis of extension with the fast directions from SKS splitting shows a consistent 20 degree divergence in the northern south Island with the two sets of vectors becoming parallel in central South Island. We firstly interpret these data as confirmation of mantle flow driving crustal kinematics. In addition we suggest the data are consistent with a mode of predominately simple and pure shear in northern and central South Island respectively.