

Is the downdip limit of the seismogenic zone governed by the presence of low-temperature serpentine minerals?

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No slippery nature of serpentine at high pressures has been pointed out based on the strength governed by frictional forces, but experimental, large-strain simple shear deformation of serpentine (lizardite and chrysotile) demonstrated homogeneous plastic flow under low-temperature (200°C), high-pressure (1 GPa) conditions corresponding to a corner of the forearc mantle wedge. The experimentally deformed serpentinites are characterized by an oblique shape fabric and a strong crystallographic preferred orientation. Consequently, the presence of serpentine at the plate interface in subduction zones would inhibit the subduction thrust earthquakes to relieve stress by plastic flow. This hypothesis is consistent with the observation of anomalously low seismic velocity in such zones.