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# Antigorite deformation and dehydration-induced compaction

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Antigorite is a key constituent of subducted slabs, and its dehydration is thought to be responsible for the generation of intermediate-depth earthquakes. The mechanical behaviour of antigorite at elevated pressure and temperature remains difficult to constrain experimentally: intracrystalline slip systems are hard to activate under typical laboratory timescales and microstructures do not always provide unambiguous evidence for dislocation creep. Here, we present recent laboratory data showing that antigorite might deform due to intracrystalline frictional slip and delamination, at least in the low temperature regime (<400°C). This behaviour is typical of the semi-brittle regime. Based on a time-independent rheology including friction and potential compaction at elevated pressure, we formulate a model for coupled deformation and dehydration of antigorite. We show that a pore pressure and compaction localisation instability can develop when the net volume change associated with the reaction is negative, i.e., at intermediate depth in subduction zones. Unstable compaction and fluid pressure build-up may provide a mechanism for the nucleation of intermediate-depth earthquakes.