Deformation mechanisms and rheology of hydrous phases in subduction

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Hydrous phases are major components of sedimentary, mafic and ultramafic rocks that interact with aqueous fluids released at depths in convergent margins. They play an especially important role at subduction interface where the presence of thin layers with high seismic anisotropy suggests intense deformation in phyllosilicates bearing-rocks such as serpentinites, blueschists and metasediments. I review the current knowledge on plastic deformation of hydrous phases with emphasis on phyllosilicates and their high-pressure transformation products (phase A). While the properties measured in experiments point to mechanical weakness of many hydrous phases, extrapolation of experimentally determined deformation laws to natural conditions is problematic. Comparison with natural samples points to the need for further experimental investigation of deformation laws in context where mechanisms other than plasticity, especially pressure-solution under fluid-saturated conditions, are at work at the high-pressure (1-4 GPa) and moderate temperatures (300-500˚C) conditions of the brittle-ductile transition along the subduction interface.

