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Experimental investigation of glaucophane rheology through shear and axial compression Griggs apparatus experiments on hot-pressed aggregates

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Constraining the rheological properties of glaucophane is critical to understanding subduction zone rheology. Based on the rock record, glaucophane is a major constituent mineral associated with subducted mafic oceanic crust at blueschist metamorphic facies. No flow law describing the crystal-plastic deformation of this mineral has been developed. Previous experimental work involving glaucophane focused on the deformation of natural polyphase rocks with an emphasis on seismic anisotropy. Here we focus on experiments intended to activate crystal-plastic deformation mechanisms in glaucophane using a monophase aggregate powder separated from natural samples from Syros Island, Greece. We are conducting general shear and axial compression experiments in a Griggs apparatus using temperatures of 600-800°C, pressures of 1 GPa and shear strain rates between 10^{-5} - 10^{-6} . Our first experiment was in a general shear orientation at 700°C, 1 GPa, and a shear strain rate of 1.18×10^{-5} . This experiment had a ~80% modal abundance of glaucophane and appears to have been dominated by brittle deformation. After the first experiment, we decided to produce a purer glaucophane aggregate powder containing ~95% glaucophane with ~5% other phases and are finishing mineral separation at the time of submission. We will present early mechanical and microstructural data from experiments with the aim of developing a glaucophane flow law. Our results will also be compared to ongoing experiments focused on the viscous properties of experimentally deformed natural aggregates (see abstract in this conference by Tokle et al.).