

## A new interpretation of decomposition products of serpentine under shock compression

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### ABSTRACT

Dense hydrous magnesium silicates (DHMSs) may play an important role in water transport during planetary accretion and as water reservoirs in the Earth's deep mantle. We show that the dynamic decomposition products of antigorite,  $Mg_3Si_2O_5(OH)_4$ , can be interpreted as containing the newly discovered, dense hydrous silicate, phase H ( $MgSiO_4H_2$ ). The Hugoniot for phase H was calculated based on the Hugoniots for its constituent oxides and equation of state data derived from first-principles calculations. The measured antigorite Hugoniot, previously suggested to decompose into high-pressure phases without generating fluid  $H_2O$ , was compared with those derived from calculations involving phase H. Sound velocity data were also compared to confirm that the dynamic breakdown product of antigorite at pressures above ~40 GPa is most likely phase H plus  $MgO$  without formation of fluid  $H_2O$ .

**Keywords:** Dense hydrous magnesium silicates, phase H, high pressure, Hugoniot, decomposition, serpentine