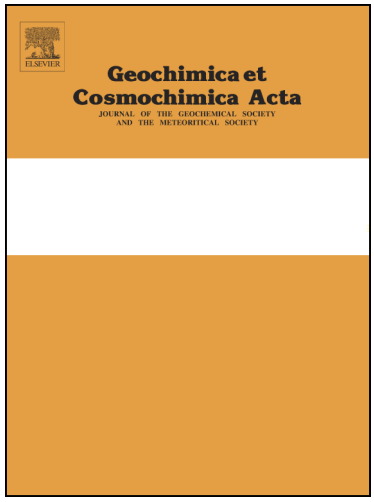

Hydrous melting and partitioning in and above the mantle transition zone: insights from water-rich MgO-SiO_2-H_2O experiments

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Hydrous melting and partitioning in and above the mantle transition zone: insights from water-rich MgO-SiO_2-H_2O experiments

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Abstract

Hydrous melting at high pressures affects the physical properties, dynamics and chemical differentiation of the Earth. However, probing the compositions of hydrous melts at the conditions of the deeper mantle such as the transition zone has traditionally been challenging. In this study, we conducted high pressure multianvil experiments at 13 GPa between 1200 and 1900 °C to investigate the liquidus in the system MgO-SiO_2-H_2O. Water-rich starting compositions were created using platinic acid ($H_2Pt(OH)_6$) as a novel water source. As MgO:SiO_2 ratios decrease, the T-X_{H_2O} liquidus curve develops an increasingly pronounced concave-up topology. The melting point reduction of enstatite and stishovite at low water contents exceeds that predicted by simple ideal models of hydrogen speciation. We discuss the implications of these results with respect to the behaviour of melts in the deep upper mantle and transition zone, and present

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