Viscosity of depolymerised silicate melts at high pressure

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We present here the results of in-situ viscosity measurements on $MgSiO_3$, $CaMgSi_2O_6$ and $CaSiO_3$ melts up to 7 GPa using the falling-sphere viscometry technique in a Paris-Edinburgh Cell [1] and X-ray radiography Imaging. We found a negative pressure dependence of the viscosity up to 7 GPa both along liquidus and at constant temperature. This is in agreement with our previous viscosity measurements on Fayalite melt but in contrast with previous studies on depolymerised silicate melts which have found a positive pressure dependence on a similar pressure range [1]. We will show that the pressure variations can likely be associated with structural changes such as the increase in Mg-O, Ca-O and Fe-O coordinations with pressure. In addition, our results compare favourably to the available numerical simulations [2] [3] and will therefore help to constrain models of depolymerized silicate melt viscosity at high pressure. This has important implications to understand planetary differentiation but also for interpreting the transport properties of modern magmas.

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