Viscosity of pyroxenite melt and its evolutionduring cooling

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New viscosity experiments performed at super liquidus temperatures and during cooling at a rate of 10 K/h have been performed at different shear rates on a synthetic pyroxenite melt prepared to resemble Theo's flow bulk rock composition. Results revealed that this composition is extremely fluid at temperature between 1646 and 1530 K and measured viscosities are between 2.2 and 7.8 Pa s. Such very low viscosities allow the lava to flow in turbulent regime as confirmed by the high Re numbers, which is always >2000. As a consequence, very long distance could be covered by the lava flow. If we consider this studied composition as proxy for Mars lava flows coupled with very high effusion rates, our results might explain the presence of extraordinary large volcanic channels, as recently hypothesized for the Kasei Valles on Mars, even considering that the gravity is ca. one third that of Earth. Few literature data tracking viscosity during cooling are available, most of which are performed at isothermal conditions, and they reported shear thinning effect on different compositions. Our experiments performed at 0.1 and 1 s^{-1} have shown a change in the apparent viscosity, confirming that rheology of lava flows needs to be studied under dynamic (i.e. non-equilibrium) conditions to better understand the real geological scenarios occurring in magmatic and volcanic systems.