

Early eruption of crystal-poor lava-like high silica large rheognimbrite in the ~2.5 Ga Dongargarh bimodal LIP (central India)

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Large single silicic to high-silicic (>73 wt. %) volcanic eruptions are the most catastrophic of all natural processes on Earth. Such gigantic explosive events are recognized mostly in the Tertiary and Recent geological history; the Precambrian occurrences are sparsely known. Combining field, petrography and chemical data, we recognize a crystal-poor high-silica (SiO_2 >76 wt. %) rheognimbrite sheet (930°-995°C) within the Bijli Rhyolite (SiO_2 >70 wt. %, ≤ 4 km thick), the basal lithostratigraphic unit in the ~2.5 Ga Dongargarh bimodal LIP (central India), metamorphosed at low-grade green-schist facies condition. Silicic pyroclastic rocks, (Bijli Rhyolite) and coeval sub-equal volumes of mafic volcanic rocks (high Mg basalts/picrite, CFB-type basalts), together constitute about two-third of the preserved stratigraphy. This rheognimbrite sheet can be traced for several km, SW of Salekasa (21°18'13.0"N: 80°29'28.2"E) and further south in the province lacking evidence of internal bedding or time breaks. It has also a uniform glassy, banded crystal-poor lava-like look with definite pyroclastic textures. Vitric bands are streaky, length: width $\geq 10:1$, deformed with tapering ends. The rheognimbrite formed from a low viscous high-silica rhyolite melt, and it was perhaps the first to have erupted during the Bijli volcanism. Using chemical composition in the MAGMA software, we calculate the bulk density of the rheognimbrite at 2350 kg/m³. As per standard measurement [1], the sheet may have a minimum dense rock equivalent volume of ≥ 800 km³, nearly two times higher than the minimum ~410 km³ characteristic of super-sized volcanism, thus representing one of the deadliest explosions recognized on Earth.

[1] Mason BG, Pyle DM and Openheimer C (2004), *Bull. Volcanol.* 66, 735-748.