

# **Tuffisite from Ebeko Volcano – a snapshot of magma fragmentation during Vulcanian explosions**

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Ebeko is an active arc volcano located on Paramushir Island in the Kurile Islands arc and a source of multiple hazards to the adjacent communities. The erupted products are predominantly highly porphyritic basaltic andesites and andesites. The current episode of activity is characterized by frequent short-lived tephra outbursts with ash clouds rising commonly up to 3 km high, considered a classic Vulcanian-style explosivity. Some larger, ballistically ejected blocks of lava (collected in 2019) from individual explosions contain intriguing bands of fragmented and welded tephra-like material (tuffisite). These tuffisite bands show intricate, elongate shapes attesting to their fluidized state prior to welding. On the microscope scale their textures strongly contrast with the surrounding coherent lava which is characterized by a holohyaline groundmass with abundant euhedral phenocrysts. In contrast, crystals in the tuffisite are fragmental and usually anhedral, with the exception of micrometer sized silica polymorphs which crystallized during subsequent sintering of the tuffisite material. We determined the physical properties of the melt to identify conditions under which fragmentation was attained. In addition a comparative study of crystal size distribution between coherent lava rocks and fragmented tuffisite was done in order to document the extent of fragmentation. Such brittle fragmentation of melt is also a potential source of seismic signals. Because this eruption is monitored in detail during the current (ongoing) eruption, we discuss the prospect, if and to what extent such subterranean localised (patchy) melt fragmentation can be the source of long-period seismic signals that are found in volcanic monitoring records.