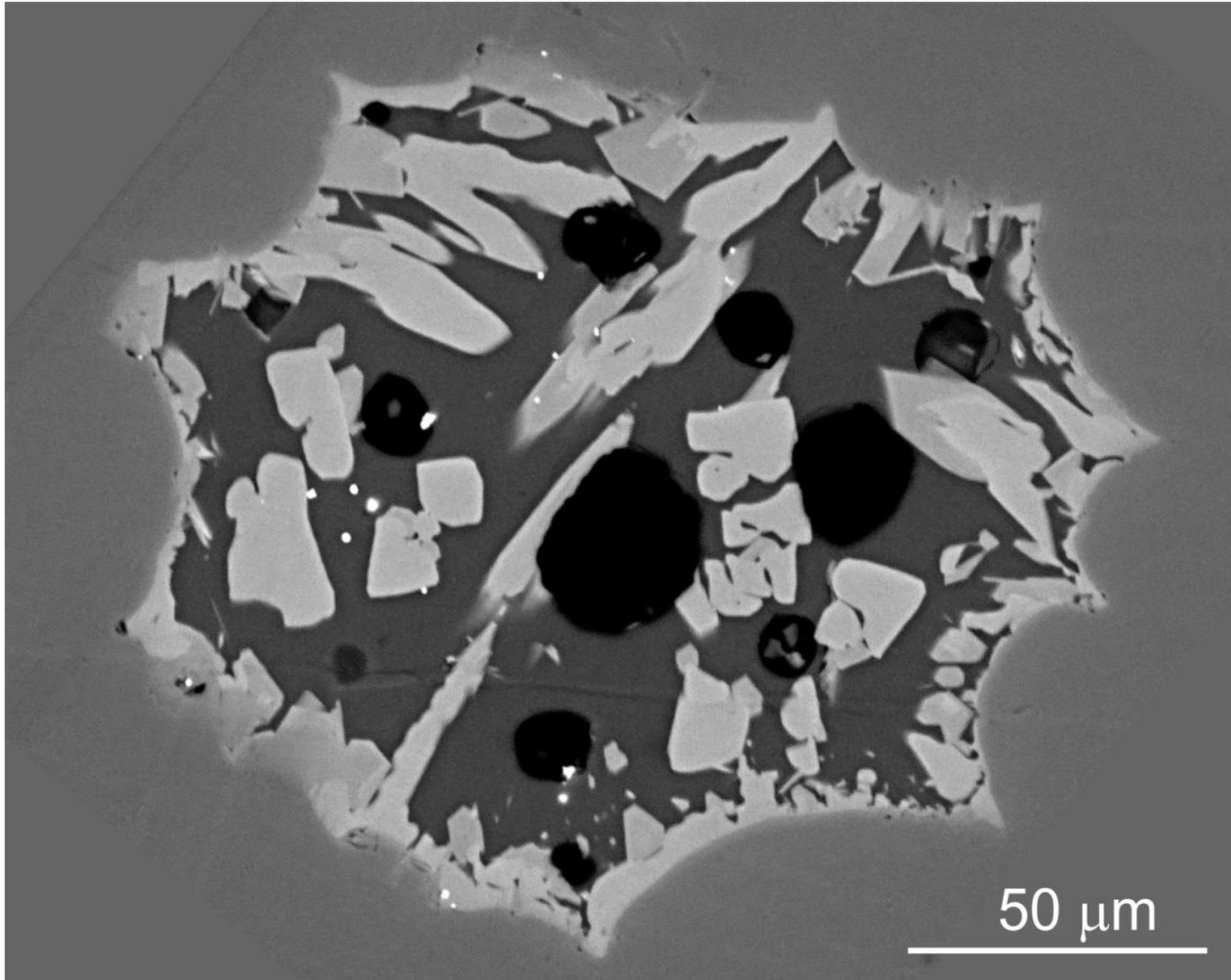


▲ The 1941 cone      ◌ Sampling field

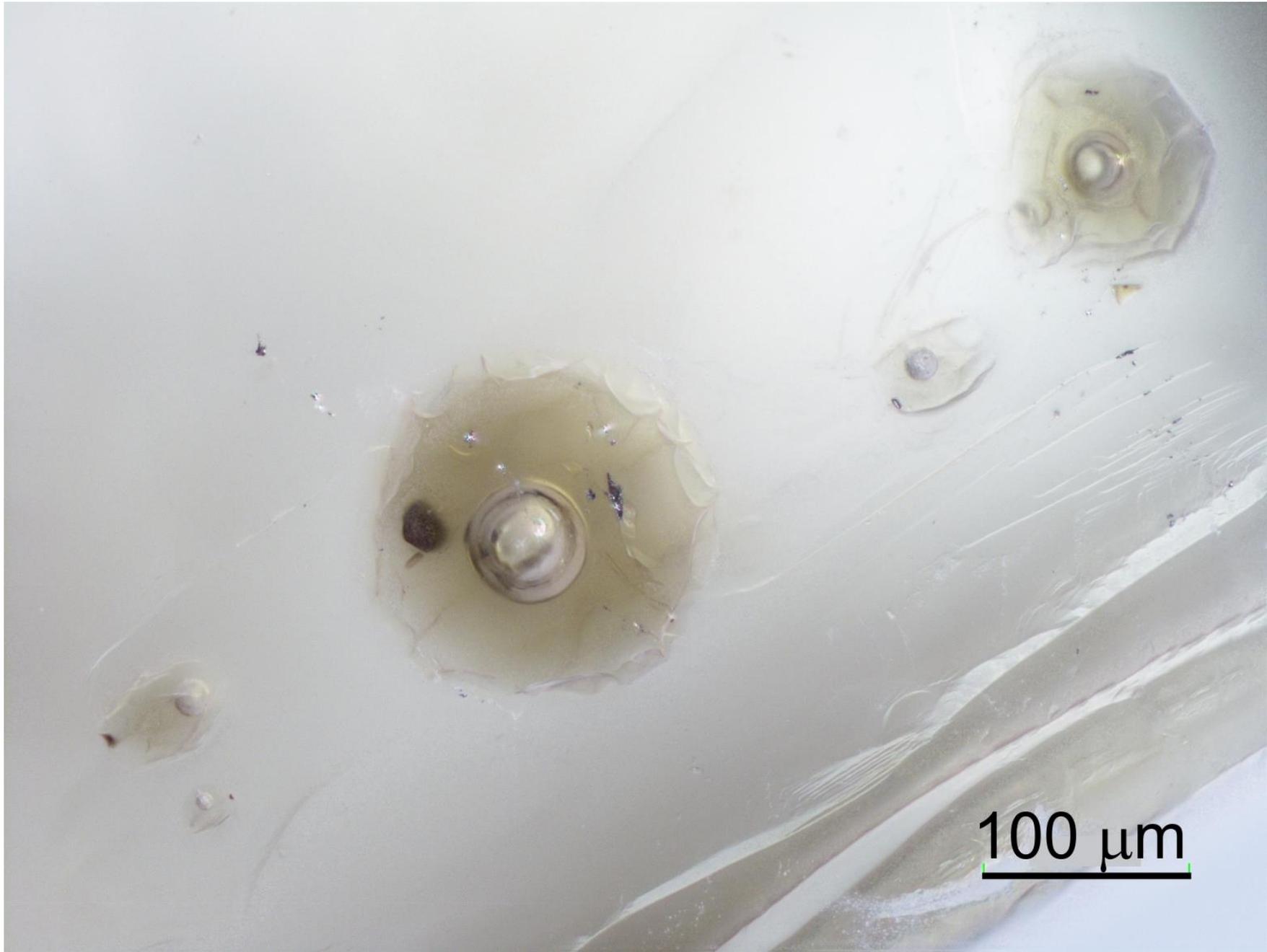
**Figure S1.** Satellite image (Google Earth) of the 1941 cone on Tolbachik, Kamchatka, and the sampling field.



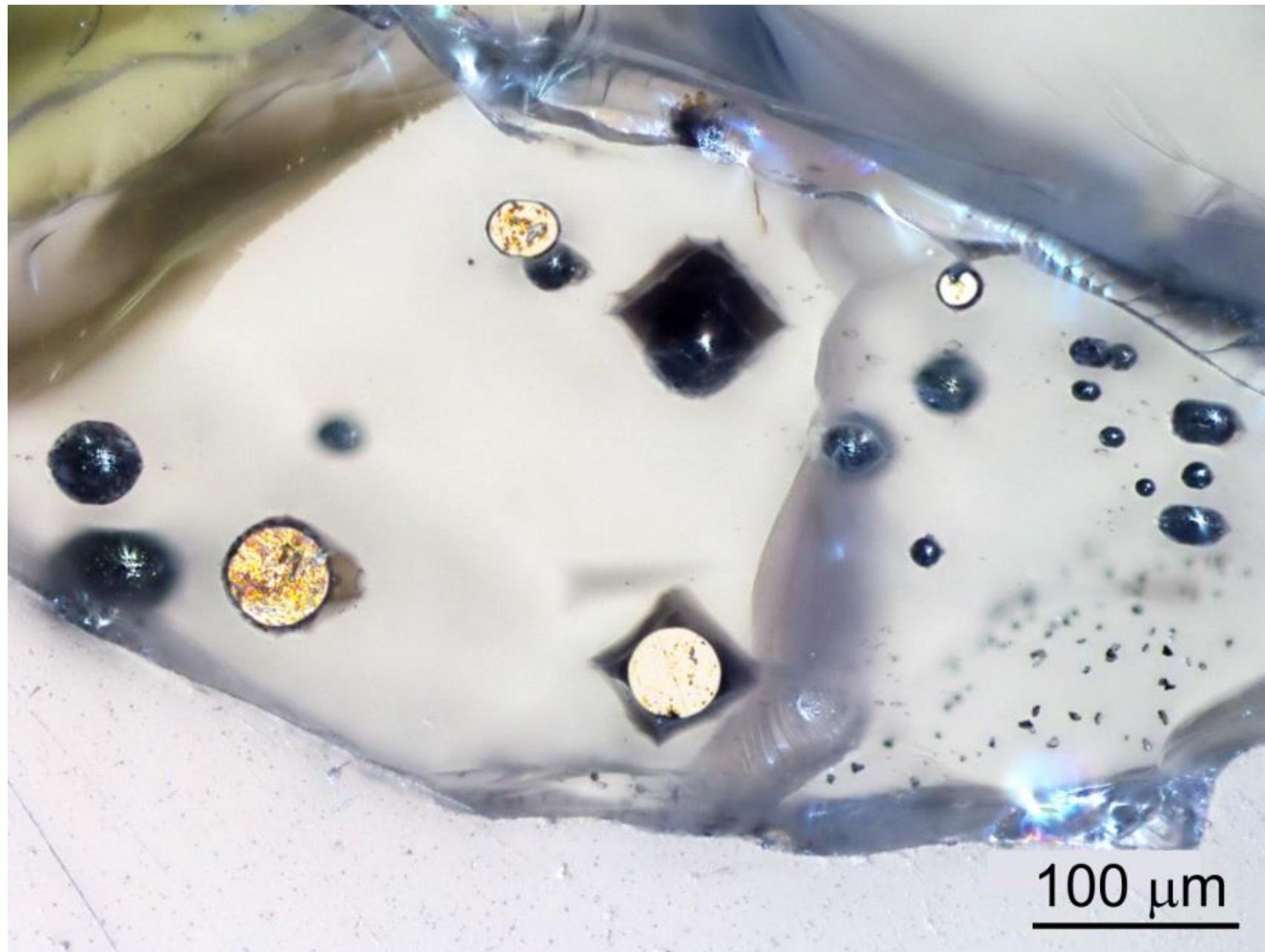
**Figure S2.** The 1941 scoria cone and the adjacent scoria field. Photo by M. Zelenski.



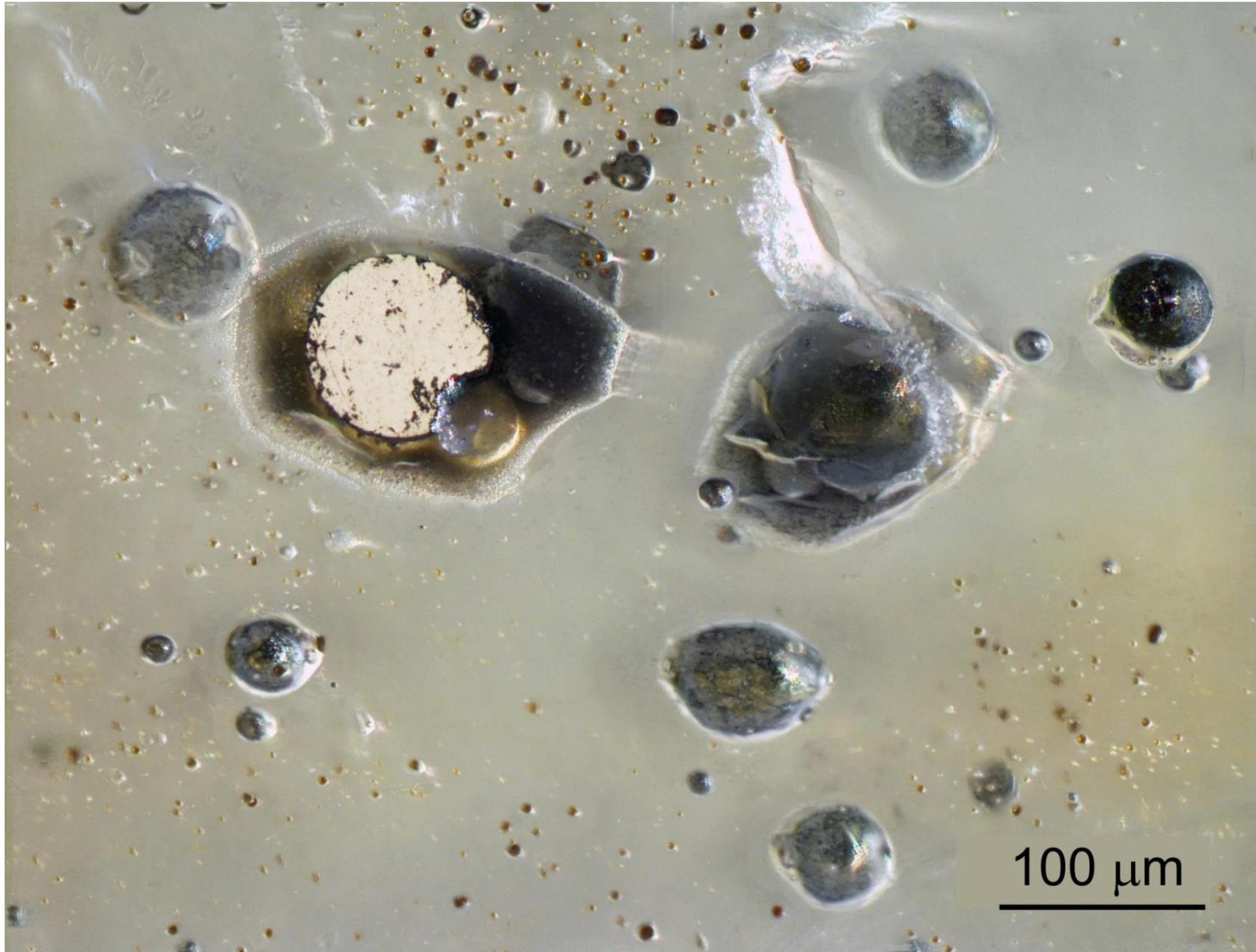
**Figure S3.** Large melt inclusion in olivine that underwent slow cooling. The 1941 Tolbachik eruption, lava flow. The sizes of daughter crystals are 20-30% of the diameter of the entire inclusion. The inclusion contains clinopyroxene, amphibole, magnetite, acid glass and several vapor bubbles.



**Figure S4.** A cluster of normal (non-oxidized) melt inclusions with light brown glass and a sulfur content of about 3000 ppm S.



**Figure S5.** An olivine crystal with a sulfide swarm and melt inclusions filled with dark brown glass. Four sulfide globules are exposed; more globules are enclosed in olivine. The 1941 Tolbachik eruption.



**Figure S6.** An olivine crystal with a swarm of sulfide globules and melt inclusions filled with dark brown glass. One sulfide globule is exposed. Numerous inclusions of brown chromite are also present. The 1941 Tolbachik eruption.