

Petrographic characterization of material ejected during eruptive phases of Copahue volcano (Argentina) in 2012

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Copahue volcano is an Andean active basaltic-andesitic stratovolcano. The crater currently hosts an hot and acidic crater lake. On July 19, 2012 a phreatic explosion occurred with emission of pyroclastic material, producing a small plume that extended 18 km on ESE direction. A sample of this event, recovered from the crater, was constituted mainly by sulphur pyroclasts, with low proportion of pumice and scoriae fragments, irregular argillaceous white material and accidental/accessory fragments. Sulphur pyroclastic material have variable sizes (3-4 mm), mostly globular morphology with vesicles, like perfect spheres or elongated forms in some cases, and like deformed 'drops' in others. On December 22, 2012 a new magmatic pulse initiated with a rapid vaporization of the Crater Lake and a phreatic eruption. Minutes later it became in phreatomagmatic with convective cloud generation and ballistic emission of blocks and bombs, and pyroclastic fall of ash, mainly dark brown pumice fragments, from the plume. Several hours later the eruptive phase turned to strombolian style, with emission of elongated volcanic bombs. The emitted material sampled 9 km far from the volcano corresponds to lapilli-sized tephra. It is mainly composed by irregularly to subrounded shaped dark gray scoria with moderate vesicularity. Another abundant component corresponds to dark brown pumice, with both fluidal and vesicular textures and high vesicularity degree. Both scoria and brown pumice contain mafic and felsic crystals in the glassy matrix. An argillaceous white material is also present in the sample, less abundant than the previous components. Accidental/accessory fragments together with mafic and felsic crystals and crystal fragments are present in the sample. The andesitic volcanic bombs reach 1.5 km away and have elongated shapes with moderate vesicularity; microscopically they are characterized by a porphyritic texture. The observed phenocrysts are euhedral oligoclase, clinopyroxene and alkali feldspars; the hialopilitic matrix is almost completely made of glass with microlites of plagioclase, alkali feldspars and clinopyroxenes. The dark brown pumiceous fragments are flat and reach up to 10 cm length. They are characterized by light weight because of their high vesicularity. Under the microscope, the dark brown pumice showed porphyritic texture, where phenocrysts represent less than 1 Percent, all euhedral and fragmented phenocrysts (oligoclase and clynopiroxene). Due to its light weight, ability to float, and mineralogy it might be named pheno-andesitic scoria. According to field observations, this ejects were thrown up by a grey plume that preceded the strombolian event. According to the preliminary study of the emitted material and the observations made during the eruption, we can infer an andesitic composition for the magma and vesiculated pumice fragments, which correspond to the initial phase, accumulated at the top of the conduit.