

## Magma dynamics at Etna before the 122BC Plinian eruption: Constraints from plagioclase zoning profiles

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The 122 BC Plinian eruption of Etna is one of the best studied highly-explosive basaltic eruption since detailed stratigraphic, textural, and compositional data, including pre-eruptive volatile content, are available. Former studies [1] proposed an eruption model in which an abrupt decompression event triggered a sudden bubble nucleation allowing the magma to develop rapidly into a microvesicular foam or alternatively the attainment of some critical threshold in rheology of foam-like magma was invoked and the occurrence of special external forces was excluded [2]. The above mechanisms, both feasible, still don't consider adequately the state and the evolution of the magmatic plumbing system before the eruption. To fill this gap we measured zoning profiles in plagioclases of different size (from large megacrysts to microphenocrysts) belonging to the Plinian deposit and plagioclase phenocrysts erupted during the Strombolian activity that preceded the paroxysmal phase. To detail the whole temporal evolution of the system we assumed that megacrysts found in Plinian products have recorded the whole pre-eruptive history, while phenocrysts and microphenocrysts account only for the final phases. Similarly, we considered the zoning of plagioclases of the Strombolian activity as representative of the state of the magmatic system before the climatic phases. Plagioclase zoning has been interpreted by comparison with synthetic profiles obtained from the thermodynamic modelling of different magmatic processes that involved single/multistage and open/closed-system paths [3]. Results indicate that the magmatic system underwent a complex evolution that entails: i) existence of at least two distinct magmatic environments; ii) progressive migration of magmas between these two environments iii) progressive overfilling and destabilization of the shallow plumbing system before the Plinian phase. This picture emphasizes the active role of the magma transfer in determining the eruptive style and allows to identify what is the combination of factors that can favour the development of such a large explosive event.

[1] Coltelli, Del Carlo & Vezzoli (1998) *Geology* **26**, 1095–1098. [2] Goepfert & Gardner (2010) *Bull. of Volcanol.* **72**, 511–521. [3] Ghiorso and Sack (1995) *Contrib Mineral Petr* **119**, 197–212.

## Leucoxene Photoactivity in the Water – Mineral System

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The photocatalytic activity of leucoxene in the water – mineral system was studied. Leucoxene was extracted from samples of titaniferous sandstones taken from quarry of Pizhenskoe deposit (Russia) (malorucheiskaya suit, Devonian). Mineral composition is presented by quartz, leucoxenized ilmenite, zircon, tourmaline, amphibole. Samples KAH-1, KAH-1-2 and KAH-1-3 were studied (Table 1).

Grain-size analysis was carried out and the TiO<sub>2</sub> content was measured for each grain-size fraction. Fractions with the highest TiO<sub>2</sub> content are shown in Table 1.

Sample	Fraction, mm	TiO <sub>2</sub> content, wt. %
KAH-1	-0.315+0.25	10.60
KAH-1-2	-0.25+0.2	12.25
KAH-1-3	-0.05	14.91

**Table 1:** TiO<sub>2</sub> content in studied samples.

Photocatalytic activity of the samples was studied using test reaction of degradation of 2, 4, 6-trichlorophenol (TCP) in water.

According to the obtained results photocatalytic activity of leucoxene samples is in direct relation with TiO<sub>2</sub> content and specific surface area.

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