Geophysical Research Abstracts
Vol. 21, EGU2019-9877, 2019
EGU General Assembly 2019

Estimating Fe3+/Fetot. ratio and water content of iron-rich rhyolites: the case study of the Green Tuff eruption (Pantelleria Island, Italy)

Stefania Sicola (1), Pierangelo Romano (2), Danilo Di Genova (3), Claudia Romano (1), Patrizia Landi (4), Silvio Giuseppe Rotolo (2,5)

(1) Roma Tre, Department of Science, L.go San Leonardo Murialdo 1, 00146 Rome, Italy(stefania.sicola@uniroma3.it), (2) Istituto Nazionale di Geofisica e Vulcanologia (INGV), Sezione di Palermo, Via U. La Malfa 153, 90146 Palermo, Italy, (3) Institute of Non-Metallic Materials, Clausthal University of Technology, Zehntner Str. 2a, 38678 Clausthal-Zellerfeld, Germany, (4) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Pisa, Via della Faggiola, 32, 56126 Pisa, Italy, (5) Dip. Scienze della Terra e del Mare (DiSTeM), Università di Palermo, Via Archirafi 22, 90123 Palermo, Italy

Iron is one of the most abundant elements in volcanic melts existing both as oxidized (Fe3+) and reduced (Fe2+) species and its oxidation state depends on several aspects such as temperature and chemistry of the magma and oxygen fugacity of the system. The iron oxidation state affects the structure and physical properties (viscosity) of melts and thereby magmatic and volcanic processes. Therefore, if the iron oxidation state of magmas can be reconstructed before and during the eruptive event then one can infer the physic-chemical conditions (oxygen fugacity and melt viscosity) that underpinned the volcanic eruption.
Of particular interest here is the relationship between the iron oxidation state (Fe3+/Fetot.) and water content of melt inclusions (MIs) belonging to Green Tuff eruption at Pantelleria Island (Italy, 45–50 ka); whose deposit is compositionally zoned from pantellerite (bottom) to trachyte (top). Specifically, these MIs belong to the: i) trachytic top member ii) upper vitrophyre of the pantelleritic ignimbrite and iii) basal pumice fallout of pantelleritic composition. These melt inclusions were studied using Raman spectroscopy.
Preliminary results show relatively high Fe3+/Fetot. ratio and water content below 2 wt.% for pantelleritic MIs, whilst trachytic MIs appear to be depleted in water.
With this study we aim at: i) constraining the pre-eruptive redox conditions of trachytic and pantelleritic melts ii) reconstructing the role of water content and degassing on the Fe3+/Fetot. ratio of these melts iii) exploring the petrogenetic relation between trachyte and pantellerite magmas.