Changes in the Eruptive Activity of Nisyros, Dodecanese, Greece: Insights From Panagia Kyra' Pyroclastic Series

S Innocenti (Department of Geosciences, The Penn State University, University Park, PA 16802; ph.814-865-9353; fax 814-863-7823; e-mail: sinnocen@geosc.psu.edu); L Francalanci (Dipartimento di Scienze della Terra, Universita' degli Studi di Firenze, Italy; ph.+39 55 2757502; fax +39 55 290312; e-mail: lorella@cesit1.unifi.it); G Vougioukalakis (IGME, Athens, 11527 Greece; e-mail: gevagel@otenet.gr)

On the eastern edge of the South Aegean arc, the island of Nisyros can be noted for its perfectly regular cone shape truncated by a large summit caldera. Nisyros is an active volcano that displays evidence of important volcanological and geochemical processes; its first subaerial volcanic activity occurred roughly 150ky b.p. and whereas its present activity is limited to emission of fumarolic gases, hydromagmatic activity has threatened the island in the recent past, with the last explosive phase occurring in1888A .D. During its whole history, Nisyros formed calcalkaline series products ranging from basaltic andesites to rhyolites. Detailed stratigraphic studies demonstrated the dramatic change in the eruptive styles of the volcano, from the beginning of its activity (150ky b.p.),when it produced andesitic and basaltic andesitic lava flows to explosive activity resulting in caldera formation (<24ky b.p.) and emission of rhyolitic products.The Panagia Kyra' pyroclastic series, roughly dated at 40ky b.p., marks the beginning of the explosive phase of activity and the end of extrusive activity. Panagia Kyra' is a sequence of fall and surge pyroclastic deposits that extends in height for 70m and has been divided into 7 stratigraphic units in the present work. A detailed examination of the volcanological, geochemical, and petrological characteristics of this pyroclastic series is presented here. Whole rock geochemical analyses display that Panagia Kyra' contains a wide range of products, representing the entire range of products recorded for the entire Nisyros stratigraphy. Interesting changes in mineral assemblages, in the whole rock geochemistry, and in the mineral chemistry of plagioclase and amphiboles are noted along the stratigraphic units. A variety of enclaves are found in the lava flows opening and closing the pyroclastic series: they represent magmas with different degrees of evolution, suggesting the occurrence of magma mixing/mingling processes. This inference is also corroborated by the bimodal distribution of basaltic, andesitic and rhyolitic products in fall deposits throughout the series tephrostratigraphy. Based upon the aforementioned stratigraphic and geochemical data we reconstructed a model for the magma processes that occurred at the change in activity at Nisyros volcano and that thus correspond to the Panagia Kyra'

pyroclastic event.