



Unravelling the complex volcanological evolution of Pantelleria Island (Channel of Sicily, Italy): new insights from the Italian Geological Mapping Project (CARG Project)

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The island of Pantelleria is an active volcanic complex, rising 800 m from sea level, situated on a continental rift within the NW sector of the Sicily Channel (Italy).

The island is characterized by a bimodal magmatism, mafic and felsic, with this latter -by far more abundant- including metaluminous trachyte and pantellerite (peralkaline rhyolites) magmas, erupted either as lava flows, pumice falls or pyroclastic currents.

This scenario, in addition to discontinuous field exposures and closely spaced (in space and time) explosive events produced by a multitude of eruptive centers producing compositionally similar deposits, makes challenging the detailed stratigraphic reconstruction of the volcanological evolution of the island.

In the last 40 years many studies have focused on specific volcanological, geochronological geochemical and petrological aspects of the island, unravelling peculiar eruptive dynamics and petrographic aspects of peralkaline magmatism. These efforts produced great steps forward in the knowledge of the volcanological evolution of the island, strictly tied to the peculiarities of peralkaline magmas. Nevertheless, a detailed geological map comprehensive the entire volcanological evolution (pre- and post -Green Tuff ignimbrite eruption) is still missing.

In the mid 70's and 80's unofficial schematic geological maps have been realized, mostly focused on lithological aspects of the erupted products and their areal distribution, summarized in the seminal paper of Mahood & Hildreth (1986) the first to define a comprehensive of pre- and post-Green Tuff stratigraphy. These studies generated discordant stratigraphic subdivisions and a not univocal stratigraphic nomenclature, until the work of Jordan et al. (2018) who defined an accurate stratigraphy and nomenclature of the pre-Green Tuff ignimbrite eruptions, adjuvated by progresses made by slightly earlier geochronological and paleomagnetic studies. The stratigraphy of post-Green Tuff volcanism, mildly explosive to effusive, though much improved by recent Ar/Ar, field and petrographic studies, still has some doubtful points.

To summarize, harmonize and integrate all the existing data into a single detailed product, the

Geological Survey of Italy (in collaboration with Palermo University) performed, between 2022 and 2024, a field survey at scale 1:10.000 in the framework of the Italian Geological Mapping Project 1:50.000 scale (CARG project).

Here, we present the preliminary geological field map of Pantelleria Island (according to CARG Project guidelines) corroborated by existent and new geochronological, geochemical and petrographic analyses on hundreds of samples collected from the different volcanic structures of the island.

Such detailed field mapping of the entire island, together with the geological survey of the offshore area (still in progress), updating the findings of previous studies, allows us to obtain the first official geological map of such an active volcanic island. This represents the first fundamental step for the development of future studies of volcanic hazard assessment.

References:

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