Geophysical Research Abstracts
Vol. 16, EGU2014-637-1, 2014
EGU General Assembly 2014

Magmatic versus tectonic influence in the Eolian arc: the case of Vulcano and Lipari islands revisited

Joel Ruch (1), Riccardo Di Lorenzo (1), Luigina Maria Vezzoli (2), Rosanna De Rosa (3), Valerio Acocella (1), Stefano Catalano (4), and Gino Romagnoli (4)

(1) Università degli Studi Roma Tre, Departmento di Scienze, Roma, Italia, (2) Università degli Studi dell'Insubria, Dipartimento di Scienze e Alta Tecnologia, Varese, Italia, (3) Università della Calabria, Dipartimento di Biologia, Ecologia e Scienze della Terra, Rende, Italia, (4) Università degli Studi di Catania, Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Catania, Italia

The prevalent influence of magma versus tectonics for the edification and the evolution of volcanic zones is matter of debate. Here we focus on Vulcano and Lipari, two active volcanic islands located in the central sector of the Eolian arc (North of Sicily). Both systems are influenced by regional tectonics and affected by historical magmatic events taking place along a NS oriented structure, connecting both islands. We revisit and implement previous structural studies performed during the 1980's considering several new geophysical, geochemical and geodynamical findings.

Four extensive structural campaigns have been performed on both islands and along the shorelines in 2012-2013 covering about 80% of the possible accessible outcrops. We collected ∼500 measurements (e.g. faults, fractures and dikes) at 40 sites. Overall, most of the observed structures are oriented N-S and NNW-SSE, confirming previous studies, however, almost all features are strikingly dominated by an EW-oriented extensive regime, which is a novelty. These findings are supported by kinematic indicators and suggest a predominant dip-slip component (pitch from 80 and 130°) with alternating left and right kinematics. Marginal faulting in most recent formations have been observed, suggesting that the deformation may occur preferentially during transient deformation related to periods of magmatic activity, instead of resulting from continuous regional tectonic processes. Overall, fault and dike planes are characterized by a dominant eastward immersion, suggesting an asymmetric graben-like structure of the entire area. This may be explained by the presence of a topographic gradient connecting both islands to the deep Gioia basin to the East, leading to a preferential ample gravitational collapse.

Finally, we propose a model in which the stress field rotates northward. It transits from a pure right lateral strike-slip regime along the Tindari fault zone (tectonic-dominant) to an extensive regime explained by the presence of magma at depth inducing a local magmatic stress field affecting structures on Vulcano and Lipari islands (magmatic dominant).