Aeromagnetic investigations of the Vulcano-Lipari volcanic complex, Italy

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http://unit.aist.go.jp/igg/rg/geophysmap-rg/amag/index.html

The Geological Survey of Japan (GSJ) has been conducting an international cooperative project with the GBA (Geological Survey of Austria) on volcanic hazard mitigation in the Aeolian Islands, Italy.

High-resolution aeromagnetic surveys at two different times separated by three years were conducted to better understand the shallow subsurface structure of the Vulcano and Lipari volcanic complex, Aeolian Islands, southern Italy, and also to monitor the volcanic activity of the area. As there was no meaningful difference between the two magnetic datasets to imply an apparent change of the volcanic activity, the datasets were merged to produce an aeromagnetic map with wider coverage than was given by a single dataset. Apparent magnetisation intensity mapping was applied to terrain-corrected magnetic anomalies, and showed local magnetisation highs in and around Fossa Cone, suggesting heterogeneity of the cone. Magnetic modelling was conducted for three of those magnetisation highs.

Each model implied the presence of concealed volcanic products overlain by pyroclastic rocks from the Fossa crater. The model for the Fossa crater area suggests a buried trachytic lava flow on the southern edge of the present crater. The magnetic model at Forgia Vecchia suggests that phreatic cones can be interpreted as resulting from a concealed eruptive centre, with thick latitic lavas that fill up Fossa Caldera. However, the distribution of lavas seems to be limited to a smaller area than was expected from drilling results. This can be explained partly by alteration of the lavas by intense hydrothermal activity, as seen at geothermal areas close to Porto Levante. The magnetic model at the north-eastern Fossa cone implies that thick lavas accumulated as another eruption centre in the early stage of the activity of Fossa. Recent geoelectric surveys showed high-resistivity zones in the areas of the last two magnetic models.