MAGNETOTELLURIC INVESTIGATION IN THE EASTERN FLANK OF MT ETNA REGION: BASEMENT MORPHOLOGY AND INFERENCES ON THE FLANK INSTABILITY

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The eastern flank of the Etna volcano is characterised by frequent, low magnitude and very shallow seismic events as well as from the clearest morphological evidence of active faulting. Displacements and creep phenomena take place along well-defined structures, sometimes, associated with seismic events and/or volcanic eruptions. These evidences, together with the support of geophysical and geologic study, made large scale flank movement on Etna increasingly accepted from the scientific community. However, even if there is a good agreement on the surface features that constrain the instable sector, basic questions remain, notably on the areal extent, nature, rate and future development of the instability. Besides the scientific interest that this setting spontaneously inspires, scientific investigations are economically supported and persuaded due to the great hazard for the densely inhabited slopes. In this framework we performed magnetotelluric measurements along profiles located in the eastern sector. The location of the MT station was chosen in order to allow significant improvements both in the MT acquisition strategy and in understanding the overall geometry and of the most active areas, such as the faulted areas. Broad-band MT data were collected in 70 soundings with GPS-synchronized EMI systems. Broadly speaking, results show a strict relationship with the respective location of the soundings. Curves morphologies, dimensional analysis, strike direction obtained from southward soundings (instable sector) are characterized by a more complex behavior. Separate and joint inversion modelling of the two magnetotelluric modes mainly paint a three layered subsurface. The electrostatic sequence is constituted by a shallow very resistive layer which cover a more conductive intermediate layer rested on a resistive basement. The horizon between the latest two is interpreted as the horizon between the conductive sliding sedimentary layer and the more resistive basement. One of the most interesting result is the thickness and geometrical behaviour of the conductive layer associated to clay sediments. Indeed it plays a key role for the risk assessment evaluation connected to the flank instability.

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