GEOELECTRICAL MEASUREMENTS AT MERAPI VOLCANO 1997-2002, PART 1: DC RESISTIVITY

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The poster summarizes the research activities of the University of Leipzig for the investigation of the resistivity structure of Merapi volcano, Central Java between 1997 and 2002. Resistivity, which is mainly influenced by porosity of volcanic rocks, saturation with and conductivity of highly ionic fluids as well as temperature, has been investigated in several spatial scales to provide constraints to structural models.

Scale 1 (the smallest) describes measurements at saturated laboratory samples to provide benchmarks for the interpretation of resistivity images in larger scales.

Scale 2 comprises several soundings at the flanks of Merapi with depths of few tens of meters and a resistivity map of the solfatara Woro, which allows a distinction between vapour and fluid dominated zones.

In scale 3 we report the results of three 2D DC electrical resistivity tomography sections with maximum depths of investigation between 800 m and 1000 m. Field method and signal processing were adapted to special high grounding resistance environments of young volcanic deposits. The models derived from this survey are related to the ones delivered by MT and LOTEM and suggest the existence of a distinct high conductivity zone beneath the southern flank, possibly caused by a hydrothermal system. At the same depth such a system is less pronounced at the western flank, and undetectable at the northern flank. The resistivity models are related to Self-potential profiles along the same flanks.

Scale 4 (the largest) refers to attempts of DC measurements from flank to flank with transmitter receiver separations in the order of 5 to 10 km. Numerical modelling was performed with 2D FE codes including topography by unstructured adaptive meshes.
Comparatively strong correlation of resistivity anomalies with topography, which is so far insufficiently known, suggests that flank-to-flank configurations are at present more valuable for monitoring than for imaging purposes. Although a full data set suitable for imaging could not yet be measured due to poor signal-to-noise ratio, individual cross-flank signals could be recovered. Therefore method seems already now promising for volcanoes slightly smaller than Merapi, which are suitable for walkover surveys.