



Inversion of SAR data in active volcanic areas using a genetic algorithm

G. Nunnari (1), G. Puglisi (2), **F. Guglielmino** (2)

(1) Department of Electrical, Electronic and System Engineering, University of Catania, Italy

(2) Istituto Nazionale di Geofisica e Vulcanologia - Sez. di Catania, Italy

We present a suite of MATLAB scripts developed to determine the parameters of a volcanic source that cause observable changes in ground deformation data recorded in volcanic areas. In particular, this paper deals with the inversion of ground deformation measured by using SAR (Synthetic Aperture Radar) interferometry and an inversion approach using the Genetic Algorithm is proposed. Based on this inversion scheme it is shown that the problem of inverting ground deformation data in terms of a single source, of Mogi or Okada type, is numerically well conditioned and the error evaluation is performed. The goodness of the inversion procedure has been assessed both using synthetic and actual SAR data. The inversion of synthetic data has shown a high reliability of the proposed approach instead, as was expected, the inversion of actual SAR interferograms is more difficult than synthetic data and the solution is improved using analytical models that take into account the topographic effects. In the paper two case studies of inverting actual SAR data recorded on Mt Etna during eruptions occurring 1998 and 2001 are investigated, showing the suitability of the proposed technique.