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Full 3D volcanic deformation fields combining GPS surveys and SBAS-InSAR

P.J. Gonzalez (1), S. Samsonov (2), P. Berardino (3) and GEOMOD team

(1) Instituto de Astronomia y Geodesia, CSIC-UCM, Madrid, Spain, (2) Now at the GNS Science - Te Pu Ao, Lower Hutt, New Zeland, (3) Istituto per il Rivelamento Elettromagnetico dell'Ambiente, CNR, Napoli, Italy (pjgonzal@mat.ucm.es)

We use state-of-art microwave based geodetic techniques to obtain three dimensional displacement point measurements using static Differential GPS and one dimensional spatially extended measurements (Line of Sight InSAR). We proposed a novel technique to generated quasi-continuous three dimensional deformation fields in volcanic areas. Based on an analytical Bayesian optimization of the *a priori* three dimensional deformation fields obtained using ordinary kriging, a geostatiscal method, we are capable to obtain full *a posteriori* three dimensional deformation fields with an estimation of the associated errors. We applied this technique to the study of a period between 2000 and 2006 covering several years before a volcanic unrest period (2004-2006) at Tenerife Island. For the studied period, we re-observed a GPS network covering the whole island six times, and we process the available ERS-2 radar images. GPS data was processed using Bernese 5.0 and SAR data was processed with the SBAS technique. Using the presented methodology, we are able to obtain sets of three dimensional deformation field solutions needed to better constrain the behaviour of underground processes using analytical ground deformation models.