



ICA-based polarization analysis on volcano-tectonic earthquakes

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A new approach for the analysis of polarization of seismic signals is proposed. The method is based on Independent Component Analysis and allows the identification and separation of the basic sources, which are naturally polarized into the vertical and horizontal planes. The results from the case study of a swarm of volcano-tectonic earthquakes occurred at Campi Flegrei in October 2015 are impressive: a clear separation of the P- and S-wave seismic phases in the time domain is obtained. In addition, the efficiency of the method in retrieving the polarization parameters is demonstrated by the comparison with other standard techniques. The presented approach provides wavefield decomposition and polarization analysis in a single step, thus avoiding a priori cumbersome filtering procedures and segmentation of the signals. It is useful for discriminating and analysing different seismic phases and can be applied to a variety of volcanic and tectonic signals, therefore it can strongly support all the studies on propagation and source mechanism. Moreover, due to its fastness and robustness this stand-alone tool can be routinely used in the volcano monitoring practice.