



## **Pattern recognition system for identifying the site of EM precursor signals preceding major seismic events**

Dionisis Cavouras (1), Pantelis Georgiadis (1), Konstantinos Ninos (1), George Minadakis (1), Konstantinos Sidiropoulos (2), and Antonis Kyriazopoulos (3)

(1) TEI-Athens, Medical Instruments Technology, Athens, Greece (cavouras@teiath.gr), (2) Brunel-University, School of Engineering and Design, Uxbridge, W. London, U.K., (3) TEI-Athens, Dept. of Civil Engineering, Athens, Greece

In the present study the use of pattern recognition techniques for the analysis of electromagnetic signals preceding seismic events is presented. Continuous recordings of electromagnetic signals (EM) at 41MHz and 46MHz were gathered from six field-stations located in western Greece from January 1999 till December 2009. Signals corresponding to recordings preceding major seismic events ( $M_s \geq 5R$ ) were segmented by an experienced scientist using custom developed software. Seismic events were divided into three site-groups, in accordance with their location. Nineteen features, derived from each segmented EM-signal, were used to feed three bootstrap aggregated (bagged) probabilistic neural network (PNN) classifiers. The output of each PNN classifier was used in the formulation of a collective decision using the majority vote rule. The overall classification performance of this scheme was evaluated by an external cross validation process to render results indicative of the generalization performance to 'unknown' events. The bootstrap aggregated PNN classification scheme gave 85.8% overall classification accuracy in correctly assigning the seismic events in their respecting location. The potentiality of correctly assigning seismic events from EM precursor signals may be assisted by pattern recognition methods.