



Precursory signals preceding by a few months a major Vrancea earthquake: their possible role in devising a risk-preparedness strategy

M.A. Anghelache (1), F. Chitea (1,2), C. Marin (3), A. Tudorache (3), and H. Mitrofan (1)

(1) Institute of Geodynamics of the Romanian Academy, Bucharest, Romania (mirelaadrianaa@yahoo.com), (2) University of Bucharest, Romania, (3) Institute of Speleology of the Romanian Academy, Bucharest, Romania

Early warning systems for earthquakes, based on the P wave's arrival at the surface, are very useful in reducing the industrial facilities vulnerability – specifically by turning off gas and electrical power supplies. Early warning systems may also save human lives, if the population was formerly subject to a coherent program of education and training. However, as far as economic losses or social disruption are concerned, this type of very short-term warning systems remains poorly efficient.

The present paper investigates what pre-event actions could be efficiently taken, provided that some longer in advance information was gained about the possibility of an extreme event occurrence in a particular area.

In Vrancea seismic region (Romania), where 2-3 catastrophic ($M \geq 7$) earthquakes are known to occur each century, there is currently investigated the possibility of taking advantage of the hydrochemical precursory signals detected at some specific saline springs, which proved to be of deep-origin and to be suitable for chemical geothermometry diagnoses. Such anomalous Na-K-Mg geothermometer signatures have been continuously recorded for more than one year, prior to a significant ($M=6$) Vrancea seismic event. There seemed, in particular, that the concerned experimental data-points approached the transition between the pre- and post-earthquake regimes progressively, over a period of a few months. This circumstance could prove to be outstandingly favorable for launching - within a reasonable time-window before the anticipated large earthquake - appropriate sets of protection actions.

The considered protection actions include mainly checking and improving the reaction-systems, with special emphasis on the reaction ability of the medical systems and verifying the infrastructure systems, especially in order to prevent critical contingencies like bottle-necks. A full collaboration between the earthquake-response professionals and the building occupants is necessary in order to develop a response plan addressing emergency protection methods (e.g.: shoring the valuable moveable heritage objects, propping equipment and materials which are liable to overturn etc). Security measures should also imply the training in counter theft, arson or any other criminal activity.

Acknowledgements:

The research was performed with financial support from the CNMP within 31036/ 2007 and 31024/2007 scientific projects.