Geophysical Research Abstracts
Vol. 13, EGU2011-13740, 2011
EGU General Assembly 2011

Active fault studies, using soil gas method, in tectonically actives zones of Himachal Pradesh state, India

Mahajan Sandeep (1), Bikramjit Singh Bajwa (2), Vivek Walia (3), Arvind Kumar (4), Surinder Singh (2), Tsanyo Frank Yang (3,4)

(1) Natural Science Division, UNESCO House, B5/29, Safdarjung Enclave, New Delhi-110029, India (mahajansandeep21@gmail.com), (2) Department of Physics, Guru Nanak Dev University, Amritsar-143005, India, (3) National Centre for Research on Earthquake Engineering, Taipei-106, Taiwan, (4) Department of Geosciences, National Taiwan University, Taipei-106, Taiwan

In an effort to quantify and appraise the use of soil gas method as a proxy to delineate active faults, detailed soil gas measurements were made during the surveys conducted in different parts of Himachal Himalayas of NW Himalayan range using soil gas grab sampling technique. The collected soil gas samples were analyzed for radon and helium using RTM-2100 (SARAD) and Helium leak detector (ALCATEL) respectively.

Soil-gas geochemistry is currently recognized as a reliable tool to seismotectonic studies. Spatial and temporal variability of gases like radon, helium, CO2, CH4 etc. in soil-gas can be used for finding fault system and for seismic surveillance. This method to investigate active tectonic structures, using soil gas composition at faults, provides relevant information about regional stress conditions which can be obtained rapidly and at relatively low cost.

In spite of the many parameters which affect the occurrence of deep-seated gases in soil, the main radon, helium soil gas anomalies were found to be distributed along major tectonic features (known/unknown) present in the study area and are in consistence with the trends of these tectonic features. Such directions agree well with those obtained by analysis of fracture patterns, the interpretation of aerial photographs and reported in literature. High gas leakage suggests that these areas are affected by greater fracturing. The coexisted spatial distribution of radon and helium shows better results than individual gas species used for this study. These co-existed anomalies of both gaseous species suggest that advection seems to be the probable mechanism for soil-gas anomalies.

Results obtained during present investigation shows that soil gas method may be used as a tool in identifying active tectonic features (faults, lineaments, and fractures), also complementing/specifying remotely sensed structures and zones.