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# Fault delineation studies along major thrust (MBT, MCT) of NW Himalayas, India using soil gas method

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A soil gas survey is conducted in Dharamsala region (area is seismically active and falls in the High Seismic Zone V of the Seismic Map of India) wherein forty soil gas samples are collected and analyzed for radon and helium concentrations. The coexisted anomalies are not only recorded along MBT-2 but also along the drainage system, indicating the presence of lineaments along these drainage systems. The results also suggest the presence of active transverse tectonic features (lineaments, faults) in the study area. Keeping in view the importance of tectonic setup in adjoining Palampur area, another soil gas survey is conducted where about thirty-five soil gas samples were collected along Chail thrust (MCT), MBT and Palampur thrust. The lineament pattern as observed from the soil gas data, in this zone is again the dominance of transverse (NE-SW) to the general strike of the Himalayas. Although. the past seismic activity does not appear to be intense as per the density of epicenters, but the dominance of transverse lineaments and other neotectonic evidences coupled with soil gas observations indicates that the future seismicity can't be overruled in this part.

The study of aerial photographs, satellite images, topographic maps supported by ground truth survey reveals that the Mandi-Sundernagar area of Himachal Pradesh, has a network of interlinked subsurface fractures. In order to define the tectonic behavior of the study area, the analysis of the photo lineament features was integrated with soil–gas prospecting. A soil gas survey, where about seventy-five soil gas samples are collected, is conducted in study area. In this study, the relationship between radon, helium soil–gas anomalies and the structural patterns derived from the photo lineament analysis are investigated for the first time. Elevated emanation of radon and helium gases are detected over major tectonic features of the study area, thus indicating anomalous permeability of these zones in comparison with the adjacent areas.

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