Geophysical Research Abstracts
Vol. 12, EGU2010-8871, 2010
EGU General Assembly 2010

Spatial variation of radon and helium in soil gas vis-à-vis geology of area, NW Himalayas, India

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In an effort to quantify the geological/lithological control on radon, helium soil gas potential and appraise the use of soil gas technique as a geological mapping tool, soil gas measurements were made, in some parts of Himachal Himalayas of NW Himalayan range, using soil gas grab sampling technique. More than 360 soil gas samples were collected from four different geological/lithologic rock units of the area under consideration. The collected soil gas samples were analyzed for radon and helium using RTM-2100 (SARAD) and Helium leak detector (ALCATEL) respectively. The observed values were then correlated with the geology/lithology of the study area. The study area is broadly divided into four different units on the basis of geology/lithology i.e. (A) Upper Shiwaliks (B) Middle & Lower Shiwaliks (C) Lesser Himalayan rocks (D) Higher Himalayan rocks. Significant differences in the soil gas concentrations among the geologic units were observed, where Lesser Himalayan rocks showing maximum concentrations of both radon (254 KBq/m3) and helium (5.46 ppm). Lesser Himalayan zone lies mainly between two major thrusts MBT and MCT running along the Himalayan trend, which still are tectonically active. It can be concluded from the present study that soil gases (radon and helium) can be used as a productive tool for geological mapping. These findings may have very important connation for health risk assessment of the area. It has been shown that soil gas radon found in soils overlying basement rocks are the main source for indoor radon concentrations since the radioactive isotopes attach rapidly to atmospheric aerosols and enter into human body thus constitute significant hazard to human health.