High concentrations of uranium and thorium in residual soils of Wailpalli watershed, Nalgonda district, Andhra Pradesh, India

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Environmental studies were carried out in Wailpalli watershed of Nalgonda district to find out the radiogenic elemental concentrations in soils and rocks of the area. The geology of the area comprises of Granites ranging from granodiorite to Granite, mafic dolerite dykes and pegmatite veins. These granites are of 2400 million years of age, they belong to Hyderabad granites. The granites contain quartz, orthoclase, microcline, hornblende etc., as major mineral phases and the accessory minerals are magnetite, zircon, allanite, fluorapatite and epidote etc. The concentration of radioactive elements is dependent on the presence of some of the above accessory phases.

Wailpalli watershed is located in between the latitudes 17º20'' to 17º80'', longitudes 78º48'' to 79º00" comprising an area of 150 sq.km. Granite exposures are mostly found in western part of watershed. 600 soil samples and 195 fresh granite samples were collected covering the entire watershed and were analysed for their U & Th content by X-ray fluorescence spectrometer. The analytical data show very high concentration of U and Th. 85% of the soil samples and 80% of the rock samples show uranium above normal levels of 1 to 4.5 ppm (in residual soils and granites IAEA, 1988) and 85% of thorium concentrations in rock and soil are above the normal levels of 1 to 15 ppm (in residual soils and granites). The results demonstrate the high concentrations of U & Th in the residual soils, which are derived geogenically from the granitic rocks. Most of the area in Wailpalli watershed is under active irrigation and these radioactive elements may enter the food chain of the human beings and may be hazardous to human health.

Identifying sources of total dissolved solids (TDS) in the Pecos River, USA

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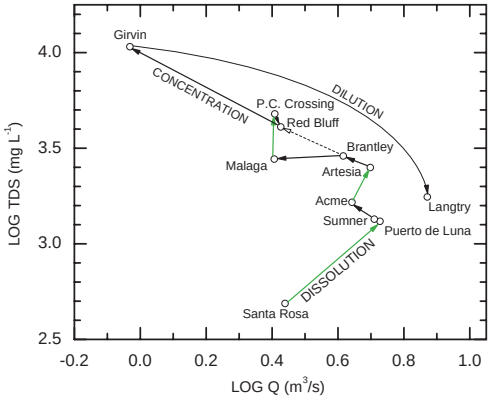
The Pecos is one saline river in the desert southwest. The causes of the high salinity (>10000 mg L^{-1}) need to be determined. Analysis of hydrological and chemical variables indicates that relationship between ion flux (L_i) and stream discharge (Q) can be best described by a log-linear function, $\log L_i = a + b \log Q$ (YUAN and MIYAMOTO, 2004). Here we use the USGS daily flow and major ion concentration records from 11 gauging stations along the river spanning 1959-2002 to estimate mean TDS load and therefore TDS concentration (Figure 1). The stream discharge is an arithmetic average of continuous daily flow, whilst the TDS is a weighted average of inferred daily TDS. Flowpath from the upper basin downward is indicated by solid arrows. This analysis suggests that the TDS of the Pecos is controlled by salt pick-up or dissolution, evaporative concentration and / or crystallization, and dilution. Salt dissolution occurs mainly in the upper basin, whereas the dilution occurs in the lower end of the basin. The evaporative concentraion is the dominant process for the increasing TDS in the middle portion of the basin. River water seeps into underground between Brantley and Malaga and back to surface between Malaga and Pierce Canyon Crossing. The losses of flow and salts upstream are offset by the gains downstream in a long run (i.e., 44 years).

Figure 1 Logarithmic graph of stream discharge (Q) vs. TDS.



Reference

Yuan F. and Miyamoto S. (2004) Geochemistry, Geophysics, Geosystems 5(12), doi:10.1029/2004GC000769.