Role of major ion geochemistry in delineating polluted parts in Southern granitic aquifer system, Andhra Pradesh, India

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The chemistry of groundwater is difficult to understand unless precipitation chemistry and atmospheric processes are taken into consideration. Limited pioneer work has been carried out on these aspects among them, Meybeck (1983) and Négrel *et al*. (1993) have marked their presence. The dual contamination is a common problem noticed in several aquifers and none other technique has been proposed till date for attempt such aquifer.

For this reason, present problem has been taken into up in a southern Indian rural granitic hydrological setting of Maheshwaram watershed, Andhra pradesh. This is a 53 km^2 watershed of sub-dendritic to dendritic type of drainage system, commonly observed in granitic setting. Total115 groundwater and rainwater samples for monsoon months of year 2006 have been collected were analysed and studied from Maheshwaram watershed 35km south of Hyderabad. For investigation rainwater quantity and its chemistry has been incorporated in conjugation with groundwater of the aquifer system. Results suggest that only few part patches of the aquifer system are considered as pollution free while the most part is exposed to pollution. Several pollution sources viz. brick klin factory, chicken farms, and agricultural activity are the common sources of pollution active in several parts of the watershed. The highest contribution is caused due to irrigational return flow. Dewandel *et al*. (2008) estimated 50-55% of the irrigation return flow from paddy fields from the watershed. Further, the competence of double correction technique has been shown for understanding dual controlled fluoride aquifers (DCF) which wasn't possible otherwise. This technique based on major ion geochemistry has a wide implication for the better understanding the groundwater chemistry. Depending on the degree and source of contamination the aquifer system could be planned for its resource utilization. Polluted zone delineation is very much significant before going for any planning for the remedial measure for dual contaminated aquifers.

Biogeophysics: Advancing earth science research through new frontiers in geophysics

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Microbes in the subsurface are known to physically alter geologic media through mineral dissolution and precipitation as well as through the formation of biofilms. Attempts to understand the role of microbes in altering the physical properties of geologic systems has resulted in the development of a new sub discipline in geophysics called *biogeophysics*. Research in this sub discipline has established a link between geophysical responses (e.g. electrical, magnetic, seismic) and enzymatic activity and bacterial growth and presents a potential for the development and utility of geophysical techniques to measure not only the subsurface physical and chemical properties as geophysics is conventionally used, but also the properties related to biological activity, processes, and interactions. This presentation will highlight examples of studies that investigate biosignatures in geophysical data and explore their potential applications to flow and transport properties, biomineralization, microbial ecology studies, remediation studies, microbial enhanced oil recovery, CO_2 sequestration, and exploration of life in extreme environments such as the deep ocean and other planets.