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Application of Isotopic Techniques Using Mathematiocal Models in Environmental Process

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During the last few decades, the use of tracer techniques in dealing with a variety of hydro-logical and hydro-geological problems have proved their value in improving the assessment , development of water resources. In this regard , the methodologies based on observations of temporal and spatial variations of naturally occurring isotopes, often referred to as { environmental isotope techniques} , are widely employed as an integral part of the routine investigations related to various hydro-logical systems, and particularly in regional groundwater aquifers.

A substantial amount of isotope data was so far collected and published from hydro-logical applications of natural isotopes, however, it is often used for qualitative inferences to be made of the system under study, and improve understanding of processes and dynamics of water circulation. The need for improved methodologies for quantitative evaluations to be made from isotope data with regards the relevant physical parameters of the system has been recognized. This has been the main motivation to intent the progress on mathematical models for quantitative evolution of isotope data in hydrology.

Isotope-hydrology(Stable and Radio isotopes) have been previously used to investigate water resources, inter-connection between different aquifers ,relationship between surface and groundwater as well as direction of recharge ,⋯etc.
Now a day ,mathematical modeling by using isotopes are used in modern ecosystem studies, for investigating the source, direction, quantity and transport of pollutant, moisture isotope fluxes in present and past climate systems ,as well as transit time estimation in catchments hydrology.

Focusing our discussion on the use of environmental tracers in water molecule itself such as , 18O, 2H, and 3H. These ideal tracers are applied by precipitation and are generally distinct isotopic-ally, which makes them reliable tracers of subsurface flow and groundwater recharge mechanism.
Two case studies were chosen, the first case illustrate calculation of the mean residence time for groundwater in the investigated area, using Tritium isotope. The age of groundwater was found in the range from few tens to several hundreds of years, reflecting the recharge mechanism and possibility of contamination. The second case study was applied using deuterium isotope balance approach to separate evaporation and seepage rates per year in lake area.

Country/Organization invited to participate

Egypt

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