THE STABLE ISOTOPE EVIDENCE ON THE ORIGIN OF TROPICAL MONSOON RAINS IN SRI LANKA

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The stable isotopes, oxygen-18 and deuterium, occur naturally in association with the water molecule predominantly as HHO-18 and HDO. The ratios D/H and O-18/O-16 are measured in natural waters against a sea water standard, known as Standard Mean Ocean Water (SMOW), using a Mass Spectrometer and expressed in o-notation (IAEA,1981). O-O-18 and O-D for sea water are close to zero, whereas those of fresh water are normally negative. The rain water in Sri Lanka shows wide variations of these heavy isotopes from one area to another (Dharmasiri, J.K.,1986). A network of seven stations was selected in January 1983 and monthly rain water samples were collected and analysed for oxygen-18 and deuterium in Vienna. The stations are Colombo, Hambantota, Tanamalwila, Batticaloa, Anuradhapura, Mannar and Nuwara Eliya. Based on a data base of 202 monthly measurements of the two isotopes upto end of 1986, the north-east monsoon rains were found to be much depleted with respect to the south-west monsoon rains. The south-west monsoon rains has its moisture originating from the sea, as indicated by OO-18 values around -3.0‰., due to winds starting from high pressure systems over Madagaskar and Australia (Meteorological Atlas,1972). The north-east monsoon rains have a OO-18 maximum of -7.0‰ in its frequency distribution. This may be due to winds, initiating from the high pressure systems over the Indian sub-continent and Siberia, feeding on moisture of fresh water origin over the land mass. The other reason may be the raining out of heavy isotopes over Bay of Bengal before reaching the land mass of Sri Lanka. Sometimes this pattern becomes complicated due to mixing and exchange of moisture of sea water origin, as a result of tropical cyclones, low pressure systems and easterly winds (Fernando, T.K., 1986) giving exceptionally heavy rains.

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References:

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