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# Origin and Atmospheric Transport of Rainwater over India in Temporal and Spatial Domains

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Identifying the source area of precipitated water is important for understanding the detailed structure of the regional hydrological cycle [1]. This is also important to understand interactions between land surface hydrology and climate. The primary sources of water for rains over India have to be in the Arabian Sea, the Bay of Bengal or the Southern Indian Ocean. Recycling through evapotranspiration of precipitated water over land can also be a significant component. The relative proportion of each varies not only temporally but also spatially.

Because stable water isotopes are influenced directly by the atmospheric processes (e.g. water vapour advection, condensation or evaporation), these have been used in several studies [2, 3] to identify vapour sources for precipitation in some areas. Interpretation of isotope data is often complicated because a number of simultaneous processes may affect the evolution of isotope character of any particular rain event/s [1]. Available isotope data from India clearly indicates climatic, hydrologic and geographic controls on their distribution [4, 5, 6, and 7].

Using the Isotope Circulation Model (ICM) [8] incorporating the Rayleigh equation and external meteorological forcing (NCEP/NCAR reanalysis), the monthly precipitation isotope data available from GNIP (IAEA/WMO) for Bombay and New Delhi have been simulated. The forcing variables are total column water vapour, vertically integrated moisture fluxes (Zonal and Maridional), precipitation and evaporation. The model predicts $\delta 18O$ in precipitation.

Several experiments using the ICM have helped aid understanding the regional hydrological cycle. The simulation experiments are also being used to study spatial hydrology of the Bay of Bengal that receives a large amount of seasonally varying influx of stream flow and also has very large seasonally varying precipitation over it.

Keywords: India; water isotopes; ICM; atmospheric circulation; evapo-transpiration; NCEP/NCAR reanalysis data; vapour sources.

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