Geophysical Research Abstracts
Vol. 17, EGU2015-585, 2015
EGU General Assembly 2015

Stable isotope ratios in rainfall and water vapour at Bangalore, Southern India during the monsoon period of 2013

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Rainwater and water vapour were collected during monsoon rainfall from Bangalore station to identifying the signature of moisture sources. Moisture responsible for the rainfall originates from Arabian Sea and Bay of Bengal and advected to the station together with vapour generated from the local . Total no of samples includes 72 for water vapour and 81 for rainwater respectively. The mean difference between water vapour and rainwater was found to be -13.27±2.5 ‰ for δ18O, -100±9 ‰ for δD, which was calculated from monthly mean values of water vapour and rainwater. The most enriched samples of rainwater and water vapour were found during the pre monsoon months which correspond to temperature maximum at the study location. Lighter isotopic ratios were recorded in samples collected during the starting of monsoon showers which goes to further depletion in δ18O during the period of post monsoon. This was mainly due to the change in the prevailing wind direction from southwest to northeast. Local Meteoric Water Line (LMWL) generated for rainwater (d = 7.49 δ 18O + 5.2555, R^2 = 0.93) equation suggesting enrichment due to evaporation. Local Vapour Line (LVL) (d = 7.5248 δ 18O + 6.6534,R^2 = 0.8957) indicates the dominance of vapor from local source. The time series of d-xcess of rainwater and water vapor reveals large variability, coinciding with the presence of transported and local sources. It was observed that rainwater and water vapor exhibits higher values indicating re-evaporation from the region. Repetition of this feature demonstrated pattern of moisture recycling in the atmosphere and the contribution of continental evaporation and transpiration. The sensitivity of isotopes to the sudden change in wind direction was documented by an abrupt variations in the isotope values. Such changes in wind patterns were mostly associated with the prevalence of low pressure depression systems during the monsoon periods. Detailed analysis on role of wind patterns and air parcel trajectories, atmospheric parameters such as rainfall, temperature and relative humidity and quantitative estimation of local source moisture source contributions will be discussed at the time of presentation.