*Geosciences Division*
*Physical Research Laboratory*

# Tuesday Seminar

## Validation of $\delta^{18}O$ as a proxy for past monsoon rain by multi-GCM simulations


### Abstract

Stable oxygen isotope ratios ($\delta^{18}O$) of tree cellulose and speleothem carbonate are useful proxies for past monsoon rain in many tropical regions, as a decrease in rain $\delta^{18}O$ is observed with increase in rainfall on a monthly time scale. This amount effect varies spatially; therefore a local calibration, with actual measurements of rain amount and its $\delta^{18}O$ is required. Such observations, however, are quite limited in space and time. To circumvent this difficulty, many isotope enabled general circulation models (GCMs) are used to aid the interpretation of $^{18}O$ proxies; nevertheless, all such simulations taken together are yet to be evaluated against observations over the Indian summer monsoon (ISM) region. Here we examine ten such GCM simulations archived by the stable water isotope intercomparison Group, phase 2. The spatial patterns of simulated ISM rainfall and its $\delta^{18}O$ are in good agreement with the limited observations available. Simulations nudged with observed wind fields show better skill in reproducing the observed spatio-temporal pattern of rainfall and its $\delta^{18}O$. A large discrepancy is observed in the magnitude of the simulated amount effect over the Indian subcontinent between the models and observation, probably because models simulate the spatial distribution of monsoon precipitation differently. Nudged simulations show that interannual variability of rainfall $\delta^{18}O$ at proxy sites are controlled by either regional (rather than local) rainfall or upstream rain out. Interannual variability of rainfall $\delta^{18}O$ over the East Asian region is well correlated with ENSO, while it is only weakly correlated over the Indian sub-continent.



**Speaker: Mr. Midhun M.**
**PDF, GSDN**


| Date | Time | Venue |
|---|---|---|
| 25-August-2015 | 16:00 hrs | Ground Floor Lecture Hall |

**All are invited to attend and participate in discussion**

Tea at 15:30 hrs


***Neeraj Rastogi, Seminar Secretary, Geosciences Division***