



Temperature significance of delta 18O under independent dominance of Monsoon and westerly in Asian monsoon region

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Delta 18O in precipitation in the Asian monsoon region has long been an interesting or even controversial issue. Strongly influenced by the Asian monsoon, particularly by the Indian monsoon, delta 18O in precipitation over the Tibetan Plateau is crucial in the whole Asian monsoon region. Our study from a systematic, continuous and long term observation and research platform called TORP (short for the Tibetan Observation and Research Platform) combined with the data set of the Global Network of Isotopes in Precipitation (GNIP) indicates that delta 18O is closely related to air temperature over the Tibetan Plateau and more broadly, in the Asian monsoon region under the independent dominance of two different climate systems, the monsoon and westerly. We separate the annual delta 18O data in precipitation into two parts, monsoon season (or wet season) and westerly season (or dry season), based on the fact the water vapor sources of the precipitation in the Asian monsoon are characterized by two different atmospheric circulations, the monsoon and westerly. We found that there exists a good positive correlation between delta 18O in precipitation and air temperature in each separate circulation which provides independent water vapor source. The study therefore explains why most of the ice core records from the Tibetan Plateau show an increase trend in delta 18O with recent global warming and an abrupt decrease of about 4.5% in delta 18O in the Last Ice Age.