

Origin of rainwater in the onset and withdrawal of Asian Monsoon over Indochina

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Using both Rayleigh-type Isotope Circulation Model (ICM) and Colored Moisture Analysis (CMA), water origin was estimated at three stations in Thailand. The daily variability of isotopic compositions in precipitation from August to November in 2001 was well reproduced by the ICM, but simulated values were constantly underestimated compared with the observations. The origin of precipitable water during 2001 was estimated by the CMA that is ICM with a tagged-water transport scheme. From the result of CMA, there are clear transition of water origin from Indian Ocean (IDO) to Java Sea and Pacific Ocean (JVS+PFO) for withdrawal of the Asian Monsoon period. The withdrawal date of the Asian Monsoon in 2001 is 22 September, 30 September, and 15 October at ChiangMai, Bangkok, and Phuket, respectively. Water origins were averaged for mid and post Monsoon periods. Most precipitable water for mid Monsoon is derived from IDO, the percentage of IDO to total column water is about 50%, 70% and 85% at ChiangMai, Bangkok and Phuket, respectively. The percentages of IDO for mid Monsoon at three stations are increasing from north to south depend on the strength of the Asian Monsoon. Also, the percentages of (Land) LND for post Monsoon are increasing from coast to inland depend on the evaporation of land.

Spatial transition of water origin around Indochina was examined for withdrawal of the Asian Monsoon. The IDO is dominant (more than 40%) for mid Monsoon, while the JVS+PFO is dominant (more than 40%) for post Monsoon. The transition of water origin from IDO to JVS+PFO is clearly shown over Indochina. It may depend on the decrease of the Asian Monsoon and westward migration of JVS+PFO. Spatial distributions of precipitation over ocean are not corresponded to each water origin, while precipitation on land over Indochina becomes smaller during whole period. The withdrawal date of the Asian Monsoon over Indochina in this study is correspond to the results of former studies defined by precipitation amount and CMAP data.

In this study, only withdrawal of the Asian Monsoon is discussed because observational isotope data is limited. Now, observation of precipitation isotope is continuing at several stations over Thailand. Further study using stable water isotopes is needed for understanding the Asian Monsoon system.