

A reconsideration of seasonal variation in precipitation deuterium excess over East Asia

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This study investigates on the remarkable seasonal variations in deuterium excess (d-excess) in precipitation over large part of the East Asia. By using the AMeDAS (Automated Meteorological Data Acquisition System) re-statistic data provided by JMA (Japan Meteorological Agency), NCEP/DOE (National Centers of Environmental Prediction/Department of Energy) atmospheric reanalysis data, and an isotope-enabled atmospheric general circulation model, the followings are found: In winter season, the 'East Asian Oceans', which include the Japan Sea, northwestern part of the Pacific Ocean, the Yellow Sea, and the East China Sea, are much warmer than the overlying surface air, and the effective relative humidity (vapor pressure normalized by saturated vapor pressure at sea surface temperature) becomes low; and evaporated vapor from East Asian Oceans, which have high d-excess due to the kinetic isotopic fractionation, cause d-excess-enriched precipitation over Japan, the Korean Peninsula, and the eastern part of China. Previously, precipitation over Japan has been believed decomposable its water vapor origin by using its d-excess because of the difference in d-excess of two distinctive sources, i.e., over the Japan Sea or the Pacific Ocean, but it is revealed difficult because of the little difference in d-excess of the two origins due to the above mentioned processes.