Seasonal variation of ^{17}O-excess of precipitation in East Asian Monsoon region, Okinawa, Japan

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A high-precision analysis of the δ^{17}O of water has provided a promising new tracer ^{17}O-excess (Barkan and Luz, 2005). The changes in ^{17}O-excess is caused by molecular diffusion process during evaporation, which is basically similar to d-excess (= δ D - 8× δ^{18}O). In fact, a positive correlation between ^{17}O-excess and d-excess of water vapor was observed in the ocean (Uemura et al., 2010). However, much lower correlations were found in Antarctica (Landais et al., 2008; Touzeau et al., 2016) and in the United States (Li et al., 2012), probably because of kinetic fractionations. Here, we measured the isotopic composition in precipitation on Okinawa jima (Japan) to reveal seasonal ^{17}O-excess variation in East Asian monsoon region. Precipitation samples were collected every week over 2 years in Okinawa, Japan. The δ^{18}O, δ^{17}O and δD of water were measured using a cavity ring-down spectroscopy (L2140-i, Picarro). The ^{17}O-excess in precipitation shows lower values in summer and higher values in winter. The seasonal variation is similar to that of d-excess, which was interpreted as changes in relative humidity in the moisture source ocean (Uemura et al., 2012). The results suggest that the precipitation in Okinawa is mainly controlled by isotope fractionation during the evaporation in the ocean.

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