

Regional Downscaling for Stable Water Isotopes: A Case Study of an Atmospheric River Event

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ABSTRACT

In this paper, an isotope-incorporated regional model is developed and utilized for simulations of an Atmospheric River event which occurred in March 2005. A set of sensitivity experiments and comparisons with observations confirm that the kinetic isotopic exchange between falling droplets and ambient water vapor below the cloud base was mostly responsible for the initial enrichment and subsequent rapid drop of the deuterium abundance in precipitation observed during the event. According to the budget analysis, the increase in isotopic composition during the latter half of the event was primarily due to horizontal advection. The contribution of condensation from different heights in the air to the ground precipitation was not reflected in the precipitation isotopes.