Water isotopic compositions of water vapor above the southern ocean - moisture source for Antarctic precipitation-

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Stable isotopes of water (deuterium and oxygen-18) in polar ice core are widely known as a proxy of past temperature changes. Deuterium excess is a combined parameter of stable isotopes of water that reflects the sea surface temperature (SST), relative humidity, and wind speed of the ocean moisture source. Recent studies have used d-excess records from polar ice cores to reconstruct the ocean surface temperatures at their water vapor source regions. However, present-day observations of d-excess of moisture over the oceans remain limited.

Cryogenic sampling of atmospheric water vapor was conducted in the south Indian and Antarctic oceans at 15 m altitude on a ship to clarify the isotope fractionation process during evaporation. From 30 December 2005 to 30 January 2006, we collected water vapor along the route between Cape Town, Lutzow-Holm Bay, and Fremantle during Cuise18 of the R&T/V Umitaka-maru

The delta-D and delta-^{18}O values of moisture decrease with higher degrees of latitude. This decrease trend can be explained by increases of fractionation factors between water and water-vapor at lower SST regions. The meridional route enabled us to investigate the widely ranged spatial relationships between d-excess of moisture and relative humidity (55 -100%) and SST (0-22 degrees Celsius). The d-excess of moisture correlates negatively with relative humidity (R^2=0.70), which is quantitatively consistent with the estimation of closure assumption model. The result suggests that the effect of sea spray evaporation is negligible. However, the d-excess of moisture does not well correlate with SST. These results provide a basis for interpretation of the d-excess in polar ice cores.