

Water vapor isotope monitoring over the Ocean

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The ship based water vapor isotopologues observation has been launched since October 2006. Surface water vapor samples were collected every day or more often along the cruise tracks of research vessel MIRAI using traditional cold trap method. Until now, spatiotemporal variation in the water vapor isotopologues from tropics to Arctic region was determined. In this presentation, we will give an overview of the results of this monitoring data.

Especially, we will focus on the tropics region, and discuss the comparison with satellite data and nudged model simulations with JCDAS/JRA25 data.

As for new findings, observed isotopic changes in surface water vapor are highly related with large-scale convective system (e.g. MJO). With the aid of modeling, we found that the isotopic signature of surface water vapor is controlled by the relative contribution of water vapor from downward mass flux in the sub-cloud layer, and its contribution is less than 30% in the weak deep convection period (inactive phase) and up to more than 60% when strong deep convection appeared (active phase). These results suggest that freshly evaporated moisture from the ocean is not a dominant source, but active water vapor recycling controls a large amount of precipitation associated with strong convection systems. This is unique information only obtained from isotope data, and will give strong impact to the meteorologist.