

## **In-situ measurements of vapor-phase HDO/H<sub>2</sub>O isotopic ratio in the Asian Summer Monsoon**

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The Asian monsoon (AM) has controlled East Asian precipitation for millions of years, and measurements of water isotopic composition have been a primary tool for this diagnosis. The AM also appears to be a significant pathway by which water vapor enters the upper troposphere/lower stratosphere region. In this work we report the first in-situ measurements of the Asian summer monsoon HDO/H<sub>2</sub>O ratio, and use them to diagnose its contribution to the total stratospheric water budget. Measurements were made by the new Chicago Water Isotope Spectrometer (ChiWIS) aboard the M55 Geophysica high-altitude research aircraft during the July/August 2017 StratoClim campaign. Isotopic profiles suggest that monsoon convection does not provide a substantial contribution to stratospheric water via sublimating ice. These results are consistent with prior satellite measurements and imply that AM dynamics and microphysics differ substantially from those in the North American monsoon system, which is characterized by high-altitude enhancement in  $\delta D$ . Monitoring of water vapor isotopic composition may thus be an important element in understanding short- and long-term evolution in monsoon behavior.