In-situ measurements of the HDO/H$_2$O Isotopic ratio in the Asian Summer Monsoon trace strong convective activity

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In-situ measurements of the HDO/H$_2$O isotopic ratio from the Chicago Water Isotope Spectrometer (ChiWIS) during the 2017 StratoClim campaign help diagnose convective processes in the Asian Monsoon. Isotopic measurements show enormous diversity in isotopic composition, likely reflecting degree of recent convective influence. Eight flights in July—August sampled a wide range of convective influence at near-tropopause altitudes, with timescales of minutes to weeks, and mean isotopic compositions from -700 per mil in recent convective outflow to -350 per mil in more aged air that is at least several days from last convective influence. Above the tropopause, we use isotopic composition to understand the fate of convective remnants. Isotopic measurements suggest much in-situ cirrus measured during StratoClim campaign is actually secondary cirrus which has reformed in an area of prior convective moistening. These flights allow detailed comparison between North American and Asian monsoons, and we compare StratoClim results to both satellite and in-situ measurements in other monsoon and tropical locations. Finally, we discuss prospects for detection and interpretation of convective remnants during the 2021/2022 ACCLIP campaign.