

## **Stratospheric Water Vapor Processes and Trends from in situ Observations**

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Stratospheric water vapor plays an important role in global climate, stratospheric chemistry and polar ozone destruction. Observations of water vapor in the stratosphere and most importantly in the tropical tropopause region are important tools to study trends and processes of stratospheric water vapor.

In situ measurements of stratospheric water vapor, ozone, and temperature using small balloon-borne sensors are launched at a number of operational and campaign based sites. Seven sites spanning from the high arctic to the southern mid latitudes are conducting a routine observational program taking observations from 6 times to about 25 times per year.

At Lindenberg, Germany, stratospheric water vapor soundings are launched twice per month, with one sounding during daytime and one during nighttime. At Boulder, CO, which has by far the longest record of stratospheric water vapor, at Hilo, HI, and at Costa Rica water vapor soundings are launched at a roughly monthly schedule. The data set at Costa Rica is currently the most extensive data set of in situ water vapor in the tropical upper troposphere and lower stratosphere. These soundings provide relative humidity over ice at the cold point tropopause and constitute the only long term data set for water vapor entering the stratosphere. Costa Rica has a pronounced rainy season with widespread deep convection as well as a distinct dry season with nearly complete absence of deep convection. On average high relative humidity values, which are observed at the tropopause, are a strong indication that dehydration occurs throughout the year.

This talk will give an update on recent trends in stratospheric water vapor, show the power of in situ observations in observing the tropical tape recorder and discuss how water vapor enters the stratosphere through the tropical tropopause.