

Trends of total water vapor column above the Arctic from satellites observations

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Atmospheric water vapor (H_2O) is the most important natural (as opposed to man-made) greenhouse gas, accounting for about two-thirds of the natural greenhouse effect. Despite this importance, its role in climate and its reaction to climate change are still difficult to assess.

Many details of the hydrological cycle are poorly understood, such as the process of cloud formation and the transport and release of latent heat contained in the water vapor.

In contrast to other important greenhouse gases like carbon dioxide (CO_2) and methane, water vapor has a much higher temporal and spatial variability.

Total precipitable water (TPW) or the total column of water vapor (TCWV) is the amount of liquid water that would result if all the water vapor in the atmospheric column of unit area were condensed. TCWV distribution contains valuable information on the vigor of the hydrological processes and moisture transport in the atmosphere. Measurement of TPW can be obtained based on atmospheric water vapor absorption or emission of radiation in the spectral range from UV to MW.

TRENDS were found over the terrestrial Arctic by means of TCWV retrievals (using Moderate Resolution Imaging Spectro-radiometer (MODIS) near-infrared (2001-2015) records).

More detailed approach was made for comparisons with ground based instruments over Sodankyla – Finland (TCWV from: SCIAMACHY 2003-2011, GOME-2A 2007-2011, SAOZ 2003-2011, GPS 2003-2011, MODIS 2003-2011)