

Statement on Using Existing NVAP Dataset (1988 – 2001) for Trends (Tom Vonder Haar and the NVAP production team, July 2010)

This statement summarizes our thoughts in regard to the frequently asked question “What is the trend in global water vapor from the NVAP (NASA Water Vapor Dataset)?”.

While other datasets (radiosonde, microwave ocean-only) have been used for trend studies (e.g. see IPCC AR4), NVAP is unique in that it covers global land and ocean by combining a variety of input sources. The NVAP dataset (available at the NASA Langley DAAC Data Center) has been used in hundreds of studies of water vapor and has proven to be valuable for daily to interannual variability studies (monsoon, ENSO, MJO etc.). Like many related climate datasets (precipitation, clouds), NVAP was originally designed for weather and process studies and not to detect climate trends.

There are several natural events and especially data and algorithmic time-dependent biases that cause us to conclude that the extant NVAP dataset is not currently suitable for detecting trends in total precipitable water (TPW) or layered water vapor on decadal scales. These include:

- Several changes in the NOAA Tiros Operational Vertical Sounder (TOVS) retrievals during the 1990's. And lack of any instrument-to-instrument calibration when the dataset was produced. TOVS data provides much of the information over land.
- Changes in the microwave ocean algorithm and supporting data (sea ice, sea surface temperature), and lack of any intercalibration of the Special Sensor Microwave / Imager (SSM/I) instruments onboard six different satellites. Radiance intercalibration of this important dataset is just beginning to appear in 2010.
- Production of NVAP in four steps during the 1990's, with new instruments as they became available.
- Large natural geophysical events occurring during the time period (1987 ENSO and transition to 1988 La Nina at the beginning of the record; Pinatubo eruption in 1991, large 1997-1998 El Nino. Whether or not one uses these events in a trend study can impact the slope of the trend line.

The NVAP dataset now available to the public has never been reanalyzed. A reanalysis effort should be a natural part of a climate dataset, as the first trend studies often uncover previously unknown errors in the data. At this time, we cannot prove or disprove a robust trend due to atmospheric changes with NVAP, as we stated in our 2005 paper “Water Vapor Trends and Variability from the Global NVAP Dataset” at the 16th AMS Symposium on Global Change and Climate Variations.

Using lessons learned from the existing NVAP data and knowledge including the factors listed above, a reanalysis effort is now underway to produce and extend the NVAP water vapor record. This effort is supported by the NASA Making Earth Science Data Records for Use in Research Environments (MEaSUREs) program (<http://esdswg.eosdis.nasa.gov/measures/#>). The new dataset covering 20+ years will be available to the public in 2012 or 2013. Updates on the status and availability of this data will be posted at the NVAP-MEaSUREs project website (<http://nvap.stcnet.com>).