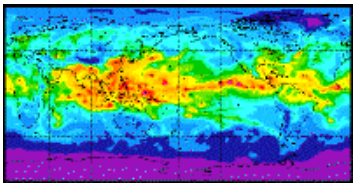
NASA Water Vapor Project (NVAP) Langley DAAC Project/Campaign Document



Summary:

Under a National Aeronautics and Space Administration (NASA) peer-reviewed contract, STC-METSAT has produced a multi-year total and layered (1988-1999) global water vapor data set. The total column (integrated) water vapor data set is comprised of a combination of radiosonde observations, Television and Infrared Operational Satellite (TIROS) Operational Vertical Sounder (TOVS), and Special Sensor Microwave/Imager (SSM/I) data sets. The global layered water vapor data set is created by slicing the total water vapor data set using layered information that TOVS and radiosonde data provides. As a companion data set for analysis, STC-METSAT also prepared a global (over oceans only), integrated cloud liquid water data set (since the best global climate models now contain liquid water as an explicit variable). The complete data set (all three sets) has been named NVAP, an acronym for NASA Water Vapor Project. STC-METSAT developed methods to process the data at a daily time scale and 1 degree x 1 degree spatial resolution. This work has become an internationally accepted contribution to the World Climate Research Programme (WCRP).

NVAP-Next Generation (NVAP-NG) is the latest phase of the NVAP data set, extending it into years 2000 and 2001. With increased power in computers and satellite sensors, the NVAP-NG data products bring increased spatial and temporal resolution. for all specific information relating to the NVAP-NG data sets, please view the Science and Technology Technical Report 3333 (PDF).

Table of Contents:

1. Project/Campaign Overview
2. Data Availability
3. Data Access
4. Principal Investigator Information
5. Submitting Investigator Information
6. References
7. Glossary and Acronyms
8. Document Information

1. Project/Campaign Overview:

Name of Project/Campaign:

NASA Water Vapor Project (NVAP)

Project/Campaign Introduction:

See Summary.

Project/Campaign Mission Objectives:

To assist scientific studies in atmospheric science, primarily those dealing with the atmospheric hydrologic cycle.

Discipline(s):

Earth Science

Geographic Region(s):

Global

Detailed Project/Campaign Description:

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2. Data Availability:

Data Type(s):

All data currently archived at the Langley DAAC are in Native format.

Input/Output Media:

Data are available via FTP from the Langley DAAC.

Proprietary Status:

There is no proprietary status for the data sets currently on-line at the Langley DAAC.

3. Data Access:

Data Center Location and Contact Information:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
Hampton, Virginia 23681-2199 USA
Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov

Associated Costs:

Currently, there is no charge for media.

4. Principal Investigator Information:

Investigator(s) Name and Address:

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6. References:

Non-NG References:

- Bates, J.J., 1991: High-frequency variability of Special Sensor Microwave/Imager derived wind speed and moisture during an intraseasonal oscillation. J. Geophys. Rev., 96, 3411-3423.
- Elliott, W.P. and D.J. Gaffen, 1991: On the Utility of radiosonde Humidity Archives for Climate Studies. Bull. Amer. Meteor. Soc., 72, 1507-1520.
- Goodberlet, M.A., C.T. Swift, and J.C. Wilkerson, 1989: Remote sensing of ocean surface winds with the Special Sensor Microwave/Imager. J. Geophys. Rev., 94, 14,547-14,555, 1989.
- Greenwald, T.J., G.L. Stephens, T.H. Vonder Haar, and D.L. Jackson, 1993: A Physical Retrieval of Cloud Liquid Water Over the Global Oceans Using SSM/I Observations. J. Geophys. Res., 98, 18471-18488.
- Petty, G.W., 1990: On the response of the Special Sensor Microwave/Imager to the marine environment - Implications for atmospheric parameter retievals. Ph. D. dissertation, 291 pp., Univ. of Washington, Seattle.
- Randel, D.L., T.H. Vonder Haar, M.A. Ringerud, G.L. Stephens, T.J. Greenwald, and C.L. Combs, July 1996: A New Global Water Vapor Dataset. Bull. Amer. Meteor. Soc., 77, 1233-1246.
- Reale, A.L., M.D. Goldberg, and J.M. Daniels, 1989: Operational TOVS soundings using a physical approach. IGARRS '89 12th Canadian Symposium on Remote Sensing, Vancouver, B.C., 2653-2657.
- Reynolds, R.W., 1988: A Real-Time Global Sea Surface Temperature Analysis. J. Climate, 1, 75-86.
- Tjemkes, S.A., and G.L. Stephens, 1991: Space Borne Observations of Precipitable Water: Part I: SSM/I Observations and Algorithm. J. Geophys. Res., 96, 10941-10954.
- Werbowtzki, A., 1981: Atmospheric sounding users guide. NOAA Tech. Report NESS 83, U.S. Dept. of Commerce, Washington, D.C.
- Wu, X., J.J. Bates, and S.J.S. Khalsa, 1993: A Climatology of the Water Vapor Band Brightness Temperatures from NOAA Operational Satellites. J. Climate, 6, 1282-1300.

NVAP-NG References:

- Asrar, G. J., A. Kaye, and P. Morel, 2001: NASA research strategy for earth system science: Climate component. Bull. Amer. Meteor. Soc, 82, 309-1329.
- Atkinson, N. C., 2001: Calibration, monitoring and validation of AMSU-B. Adv. Space Res., 28/1, 17-126.
- Cohen, J. L., D. A. Salstein, and R. D. Rosen, 2000: Interannual variability in the meridional transport of water vapor. Jour. Hydrometeorology, 1, 547-553.
- Colton, M. C. and G. A. Poe, 1999: Intersensor calibration of DMSP SSM/I's: F-8 to F14, 1987-1997. IEEE Trans on Geosci. and Rem. Sens., 37/1, 418-439.
- Engelen, R. J. and G. L. Stephens, 1998: Characterization of Water Vapour Retrievals from TOVS/HIRS and SSM/T-2 Measurements. Quart. J. Roy. Met. Soc., 125/553, 331-351.
- Forsythe, J. M., D. L. Randel, S. Woo, D. S. McKague, and T. H. Vonder Haar, 2003: Extending the 12-year NVAP global water vapor dataset into the 21st century. Preprints, 12th AMS Conference on Satellite Meteorology and Oceanography, Long Beach, California, Feb. 2003.
- Greenwald, T. J., G. L. Stephens, T. H. Vonder Haar, and D. L. Jackson, 1993: A physical retrieval of cloud liquid water over the global oceans using SSM/I observations. J. Geophys. Res., 98, 18471-18488.
- Grody, N.C., 1991: Classification of snow cover and precipitation using the Special Sensor Microwave/Imager (SSM/I). J. Geophys. Res., 96, 7423-7435.
- Huffman, G. J., R. F. Adler, B. Rudolf, U. Schneider and P. R. Keehn, 1995: Global precipitation estimates based on a technique for combining satellite-based estimates, rain gauge analysis, and NWP model precipitation information. J. Climate, 8, 1284-1295.
- Kalnay, E., M. Kanamitsu, R. Kistler, W. Collins, D. Deaven, L. Gandin, M. Iredell, S. Saha, G. White, J. Woollen, Y. Zhu, M. Chelliah, W. Ebisuzaki, W. Higgins, J. Janowiak, K. C. Mo, C. Ropelewski, J. Wang, A. Leetsmaa, R. Reynolds, Roy Jenne, and Dennis Joseph, 1996: The NCEP/NCAR 40-year reanalysis project. Bull. Amer. Meteor. Soc, 77, 437-471.
- Kidder, S. Q., M. D. Goldberg, R. M. Zehr, M. DeMaria, J. F. W. Purdom, C. S. Velden, N. C. Grody, S. J. Kusselson, 2000: Satellite Analysis of Tropical Cyclones Using the Advanced Microwave Sounding Unit (AMSU) Bull. Amer. Meteor. Soc, 81/6, 1241-1259.
- Koch, S. E., M. Desjardins, and Paul J. Kocin, 1983: An Interactive Barnes Objective Map Analysis Scheme for Use with Satellite and Conventional Data. J. Climate and Applied Meteorology, 22, 1487-1502.
- McKague, D. S., R. J. Engelen, J. M. Forsythe, S. Q. Kidder, and T. H. Vonder Haar, 2001: An optimal-estimation approach for water vapor profiling using AMSU. 11th AMS Conference on Satellite Meteorology and Oceanography, Madison, Wisconsin.
- Randel, D. L., T. H. Vonder Haar, M. A. Ringerud, G. L. Stephens, T. J. Greenwald, and C. L. Combs, 1996: A New Global Water

Vapor Dataset. Bull. Amer. Meteor. Soc, 77, 1233-1246.
- Reale, A. L, 2001: NOAA Operational Sounding Products from Advanced-TOVS Polar orbiting Environmental Satellites. NESDIS Technical Report 102.
- Reynolds, R. W., N. A. Rayner, T. M. Smith, D. C. Strokes, and W. Wang, 2002: An improved in situ and satellite SST analysis for climate. J. Climate, 15, 1609-1625.
- Ross, R. J., W. P. Elliott, and D. J. Seidel, with Participating AMIP-II Modeling Groups, 2002: Lower-Tropospheric Humidity-Temperature Relationships in Radiosonde Observations and Atmospheric General Circulation Models. Jour. of Hydrometeorology, Vol. 3, No. 1, pp. 26-38.
- Simpson, J. J., J. S. Berg, C. J. Koblinsky, G. L. Hufford, and B. Beckley, 2001: The NVAP global water vapor dataset: Independent cross-comparison and multiyear variability. Remote Sensing of Environment, 76, 112-129.
- Susskind, J., P. Piraino, L. Rokke, L. Iredell, and A. Mehta, 1997: Characteristics of the TOVS Pathfinder Path A Dataset. Bull. Amer. Meteor. Soc., 78/7, 1449-1472.
- Suggs, R. J. and G. J. Jedlovec, 2001: Internal consistency of the NVAP water vapor dataset. 11th AMS Conference on Satellite Meteorology and Oceanography, Madison, Wisconsin.
- Vonder Haar, T. H., J. M. Forsythe, D. L. Randel, and S. Woo, 2003: Analysis of the NVAP water vapor dataset: A tool for monitoring Earth's water vapor from daily to decadal scales. Preprints, 12th AMS Conference on Satellite Meteorology and Oceanography, Long Beach, California, Feb. 2003.
- Vonder Haar, T. H., D. L. Reinke, D. L. Randel, G. L. Stephens, C. L. Combs, and T. J. Greenwald, 1995: Production of a long-term global water vapor and liquid water data set using ultra-fast methods to assimilate multi-satellite and radiosonde observations. STC Technical Report 2927. Final Report, NASA Contract NASW-4715. 24 pp. Science and Technology Corporation, Hampton, Virginia.

7. Glossary and Acronyms:

EOSDIS Acronyms (PDF).

8. Document Information:

- **Document Revision Date:** December 10, 1997; March 31, 2003; March 15, 2004
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