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Data Set Description:

Instrument:	NCEP temperature and height profiles
Site(s):	All NDACC stations
Measurement Quantities:	Temperature
	Geopotential Heights

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Reference Articles:

Finger, F. G., M. E. Gelman, J. D. Wild, M. L. Chanin, A. Hauchecorne, and A. J. Miller, 1993: "Evaluation of NMC Upper stratospheric temperature analyses using rockesonde and lidar data", Bull. Am. Meteorol. Soc., Vol. 74, pp 789-799, doi: https://doi.org/10.1175/1520-0477(1993)074<0789:EONUST>2.0.CO;2.

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Fleming, H. E., M. E. Goldberg, and D. S. Crosby, 1988: "Operational implementation of the minimum variance simultaneous retrieval method", in Third Conference on Satellite Meteorology and Oceanography, pp. 16-19, American Meteorological Society, Boston, Mass.

Gelman, M. E., A. J. Miller, K. W. Johnson, and R. M. Nagatani, 1986: "Detection of long-term trends in global stratospheric temperature from NMC analyses derived from NOAA satellite data", Adv. Space Res., Vol. 6, pp. 17-26.

Goldberg, M. D. and J. M. Daniels, 1988: "A method for obtaining an improved approximation for the temperature/moisture retrieval problem", in Third Conference on Satellite Meteorology and Oceanography, pp. 20-23, American Meteorological Society, Boston, Mass.

McPherson, R., D., K. H. Bergman, R. E. Kistler, G. E. Rasch, and D. S. Gordon, 1979: "The NMC operational global data assimilation system," Mon. Wea. Rev., Vol. 107, pp 1445-61.

Wild, J. D., M. E. Gelman, A. J. Miller, M. L. Chanin, A. Hauchecorne, P. Keckhut, R. Farley, P. D. Dao, J. W. Meriwether, G. P. Gobbi, F. Congeduti, A. Adriani, I. S. McDermid, T. J. McGee, E. F. Fishbein, 1995: "Comparison of stratospheric temperatures from several lidars, using National Meteorological Center and microwave limb sounder data as transfer references," Journ. Geo. Res., Vol. 100, pp. 11105-11111.

Instrument Description:

NCEP meteorological data analyses are based upon rawinsonde data and measurements by the NOAA polar orbiting operational satellites of upwelling atmospheric and terrestrial radiation. Each satellite contains three multichannel instruments, the High-resolution Infrared Sounder (HIRS), the Microwave Sounding Unit (MSU), and the Stratospheric Sounding Unit (SSU), which together form the TIROS Operational Vertical Sounder (TOVS).

To account for discrepancies in measurements between satellites a set of adjustments has been developed (Finger et al., 1993), and are shown in the adjustments document provided at the NDACC DHF. Adjustments should be applied by subtracting:

Adjusted value = Retrieved value - Adjustment

Beginning May 1, 2001. CPC stratospheric analyses switched from the Stratospheric Sounding Unit (SSU) to Advance Microwave Sounding Unit (AMSU). The switch is necessary due to both,

1. SSU is being phased out
2. AMSU has higher vertical resolution and denser horizontal coverage.

The AMSU retrieval algorithm already takes rawinsonde and rocketsounde biases into consideration, there is no longer a need for pressure level dependent bias adjustment.

Algorithm Description:

Temperature and geopotential height profiles for the NDACC sites are obtained by interpolation of NCEP gridded analysis fields to the NDACC station location. NCEP gridded geopotential heights and temperatures are derived from two analysis systems: 1) tropospheric fields from 1000mb to 100mb, and 2) stratospheric analyses from 70 mb to 0.4 mb.

The tropospheric fields from 1000 mb to 100 mb are the 1200 GMT gridded fields which are part of the Global Daily Assimilation System (GDAS) described by McPherson et al. (1979), where data from radiosondes, aircraft, satellites, ships, buoys, or any other conventional means are assimilated and merged into meteorological fields (heights, temperature, winds).

The stratospheric analyses developed by the NCEP Climate Prediction Center are 1200 GMT operational analyses at the 70-0.4 mb pressure levels. The analysis method is a modified Cressman analysis (Gelman et al., 1986), where the fields are iteratively adjusted by weighted data depending on distance from the grid point. The analyses use NOAA TIROS operational vertical soundings retrievals based on a minimum variance simultaneous retrieval method described in Goldberg et al. (1988), Fleming et al. (1988), and Fleming et al. (1986).

The northern hemisphere analyses at 70 to 10 mb are heavily dependent on radiosonde data (particularly over the continents), but less dependent on radiosonde and more dependent on the TOVS data over ocean areas.

Since temperature analyses at 5 to 0.4 mb are based on TOVS data, adjustments are necessary due to changes of operational satellite. Adjustments have been derived from rocketsonde data, and verified using lidar data (Finger et al., 1993).

Beginning May 1, 2001. Temperature and geopotential height profiles for NDACC sites are obtained by interpolation of NCEP gridded analysis fields to the NDACC station location. NCEP gridded geopotential heights and temperatures are derived from two analysis systems:
1) GDAS data fields from 1000mb to 10mb
2) CPC stratospheric analyses from 5 mb to 0.4 mb.

Expected Precision/Accuracy of Instrument:
An error estimate is listed in the files.