Geopotential Heights and Mean Tropospheric Temperatures

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Abstract
The geopotential heights of constant-pressure surfaces changes on climatological time scales as a consequence of warming or cooling of the underlying atmosphere. Dry temperature retrievals of RO measurements provides a direct means of measuring the geopotential heights of upper-troposphere and lower-stratosphere pressure surfaces and, hence, mean tropospheric temperatures. Time series of geopotential heights derived from CHAMP, GRACE, and FORMOSAT-3/COSMIC currently provide a continuous 13-year climate data record from 2001 to 2014. The possibilities and limitations of this approach to monitoring the global troposphere are explored, and the RO-based mean tropospheric temperatures are compared to tropospheric temperatures based on AMSU/MSU data and on global reanalysis data.