

A climate record of merged water vapor, temperature and cloud observations from the A-Train

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Instruments in the A-Train satellite constellation are providing a detailed record of climate. Because observations from different instruments are collocated and essentially simultaneous, they can be combined to provide insights into a number of 'fast' processes, especially those involving clouds. However, the different A-Train instruments were not explicitly designed to work together, so interpreting observations between instruments offers several challenges. First, varied data sets must be assembled from several sources. Next the basic task of spatial co-registration of Level 1 and Level 2 data sets must be completed. Finally, analysts must understand two or more data sets, each typically containing hundreds of named variables, whose processing histories are usually uncoordinated, and derived from source instruments with varied spatial and spectral resolutions. Despite these challenges, multi-sensor data sets are providing insights not available from a single instrument. We describe climatologies, and climate process studies, of temperature, water vapor and cloud phenomena using collocated observations from AIRS, CloudSat, AMSR-E and MODIS in the A-Train satellite constellation.