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Visualizing Global Cluster-Compressed Multivariable and Multi-altitude Atmospheric Data

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Abstract

This talk addresses the challenge visualizing global cluster-compressed atmospheric data derived from the Atmospheric Infrared Sounder (AIRS). The AIRS data includes radiance values for 2378 spectral channels collected as the Aqua satellite orbits the earth. NASA processing converts this data to geophysical parameters. The overviews pursued here are related to NASA Level III* products that consist of cluster-compressed summaries for 5 x 5 degree grid cells covering the earth. Each typical grid cell has many summary clusters and each individual cluster has 35 variables including temperature and water vapor at 11 altitudes and cloud fraction at 10 altitudes. This talk shows four approaches to visualizing these summaries. Two approaches use dynamic graphic packages (GLISTEN and CCmaps) that do not scale to the whole earth but are of potential interest for localized studies. Older dynamic software called CystalVision does scale and could be refined to help provide insights. The fourth approach, implemented using R, clusters grid cells of the earth based on their multiple cluster-compressed summaries. The resulting four maps for the Northern Hemisphere winter months of years 2002 to 2005 show interesting patterns. For example one cluster of grid cells involves ocean cells west of South America and Africa. The atmospheric similarities are likely related to the upwelling of cold water from Antarctica. Assessment of grid cell similarities over both space and time (years) would involve much more processing but provide a more coherent basis for visualizing clusters over time. Overviews suggestive of emergent patterns can motivate more detailed study.