Latent Heating from TRMM and GPM Satellite Measurements

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Rainfall production is a fundamental process within the Earth's hydrological cycle because it represents both a principal forcing term in surface water budgets, and its energetics corollary, latent heating, is the principal source of atmospheric diabatic heating. Latent heat release itself is a consequence of phase changes between the vapor, liquid, and frozen states of water. The properties of the vertical distribution of latent heat release modulate large-scale meridional and zonal circulations within the Tropics - as well as modify the energetic efficiencies of mid-latitude weather systems. This paper highlights the retrieval of latent heat release from satellite measurements generated by the Tropical Rainfall Measuring Mission (TRMM) and Global Precipitation Mission (GPM) satellite observatory, which were launched in November 1997 and February 2014, respectively. Both TRMM and GPM measurements have been providing an accurate four-dimensional account of rainfall over the global Tropics and mid-latitudes: information that can be used to estimate the space-time structure of latent heating.

Two sets of latent heating retrieval algorithm methodologies (Goddard Convective-Stratiform or CSH, and Japan Spectral Latent Heating or SLH) have been developed to estimate latent heating based on rain rate profile retrievals obtained from TRMM and GPM measurements. The differences and similarities between the CSH and SLH algorithm design will be presented. The presentation then will provide the results of LH structures derived from the TRMM and GPM. At the end of presentation, the further research on latent heating retrieval from satellites will be discussed.