

TRMM DATA ASSIMILATION AT NASA

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We give an overview of the research at NASA in assimilating tropical rainfall and total precipitable water (TPW) retrievals derived from the TRMM Microwave Imager (TMI) and the Special Sensor Microwave/ Imager (SSM/I) instruments. Global analyses currently contain order-one errors in the primary fields of the hydrological cycle such as precipitation, evaporation, moisture, and the related cloud fields, especially in the tropics. We show that an effective strategy to assimilate tropical rainfall data is to use observations to compensate for errors in moisture tendencies produced by the assimilation model. Results show that assimilating TMI and SSM/I surface rainrates and TPW estimates improves short-range forecasts and reduces state-dependent systematic errors in the hydrological cycle and related climate parameters such as cloud, radiation, and the large-scale circulation in the tropics. The study provides a demonstration of the potential of using rainfall and moisture observations derived from passive microwave instruments to improve the quality of 4-dimensional global datasets for climate analysis and weather forecasting applications.