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NEWS Climatology Project: The state of the energy budget at continental to global scales

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Our ability to predict climate change is fundamentally connected to our understanding of the processes that govern global energy balance. Changes in global temperature are ultimately governed by the net flux of energy into the Earth-atmosphere system while the time-scales of responses to energy imbalances is largely governed by the partitioning of this energy between the atmosphere and the oceans. Accurate observational estimates of fluxes of energy between the surface, atmosphere, and space are, therefore, a critical first step toward evaluating model predictions of future climate. This presentation will document recent efforts by NASA's Energy and Water cycle Study (NEWS) to provide the best available estimates of the annual cycle of global and regional energy budgets using state-of-the-art satellite data products. Rigorous error analyses will be summarized for each component flux with an eye toward establishing the degree to which balance can be achieved within the constraints of observational uncertainties. In combination with a companion NEWS study focusing on the water cycle, the resulting global and regional energy fluxes represent important observational benchmarks of the current state of the climate system and provide important metrics to anchor global climate models.