Utilization of Hydrologic remote sensing data in land surface modeling and data assimilation: Current status and Challenges

Recent advances in remote sensing technologies have enabled the monitoring and measurement of the Earth's land surface at an unprecedented scale and frequency. The myriad of these land surface observations must be integrated with the state-of-the-art land surface model forecasts using data assimilation to generate spatially and temporally coherent estimates of environmental conditions. These analyses are of critical importance to real-world applications such as agricultural production, water resources management and flood, drought, weather and climate prediction. This need motivated the development of NASA Land Information System (LIS), which is an expert system encapsulating a suite of modeling, computational and data assimilation tools required to address challenging hydrological problems. LIS integrates the use of several community land surface models, use of ground and satellite based observations, data assimilation and uncertainty estimation techniques and high performance computing and data management tools to enable the assessment and prediction of hydrologic conditions at various spatial and temporal scales of interest. This presentation will focus on describing the results, challenges and lessons learned from the use of remote sensing data for improving land surface modeling, within LIS. More specifically, studies related to the improved estimation of soil moisture, snow and land surface temperature conditions through data assimilation will be discussed. The presentation will also address the characterization of uncertainty in the modeling process through Bayesian remote sensing and computational methods.