

Ecosystem Forecasting

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Abstract

The satellites comprising NASA's Earth Observing System (EOS) Program can collect high quality satellite data to quantify the state and fluxes of the dynamic Earth System. Now those EOS satellites are being launched and have begun to collect data. The challenge is to improve our understanding and produce a predictive capability of the highly integrated Earth System. Most Earth science studies employing satellite data are retrospective analyses, however important predictions that impact decisions and actions must be made in real time. Investments in technology and technology integration are necessary to produce a capability to do on-line analysis of satellite data and make forecasts of important ecosystem conditions (snowpack, runoff, soil moisture and primary plant production) that are useful in resource management. We have developed a data assimilation system, TOPS, (Terrestrial Observation and Prediction System) that integrates satellite data, surface weather observations and weather/climate forecasts with a terrestrial ecosystem model. TOPS produces daily 1 km^2 estimates of carbon and water fluxes using MODIS derived leaf area index, land cover and gridded meteorological data created using over 2000 surface weather stations over the conterminous U.S. Daily outputs are expressed as anomalies from historical normals that were computed using 20 years (1982-2001) of satellite and surface weather data.