



# An Integrated, Observation-Driven Hydrological Modeling System Using LIS and WRF-Hydro Enabled by ESMF



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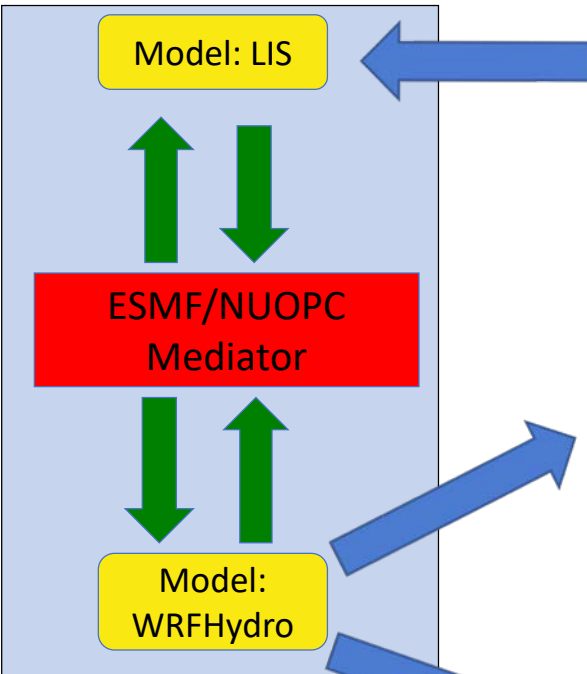
A comprehensive hydrologic modeling system is being developed at NASA-GSFC by coupling NASA's Land Information System (LIS) land surface modeling and data assimilation system to NCAR's Weather Research and Forecast (WRF-Hydro) hydrologic modeling system.

LIS/WRF-Hydro coupling has been achieved using Earth System Modeling Framework (ESMF) infrastructure with specialized "mediator" components for managing data exchanges across physical interfaces and to support flexible data assimilation (DA) of different types, e.g., soil moisture, snow, surface temperature.

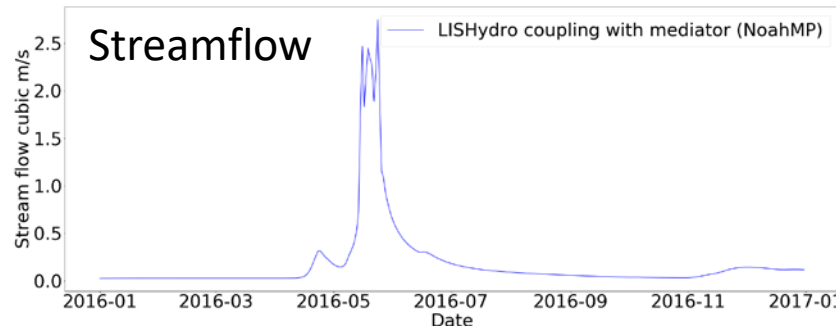
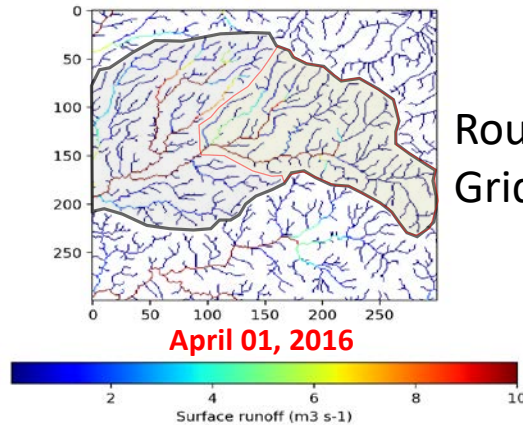
The target system adheres to a nationally-recognized interoperability layer called the National Unified Operational Prediction Capability (NUOPC) Layer.

**Figure 1:** Satellite-based hydrological products (e.g. snow water equivalent) can be assimilated by LIS, and used to drive the lateral surface/subsurface flow in WRF-Hydro to generate more accurate hydrology and streamflow estimates.

## LIS/WRF-Hydro System



Satellite Data



Gangodagamage et al., 2018: Improving hydrological simulations via the integration of remotely sensed data assimilation and coupling of the WRF-Hydro model with NASA's Land Information System (LIS). 2018 AGU Fall Meeting, Washington D.C. <https://agu.confex.com/agu/fm18/meetingapp.cgi/Paper/443641>