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Enhancing the hydrological drought monitoring capability of the **US Drought Monitor**

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Project Team

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Project Title: *Enhancing the hydrological drought monitoring capability of the US Drought Monitor*

Overarching Goal

- To enhance the hydrological drought monitoring capability of the US Drought Monitor (USDM) by leveraging state-of-the-art hydrological modeling and data assimilation systems.
- Special consideration will be given to the managed systems.

❓ **What is a hydrological drought?**

- In general, hydrological drought refers to the water stress in streams, groundwater, snowpack, lakes, and reservoirs.

❓ **What are the potential benefits?**

- More accurate USDM maps.
- Better decision-making for both managed and unmanaged systems.

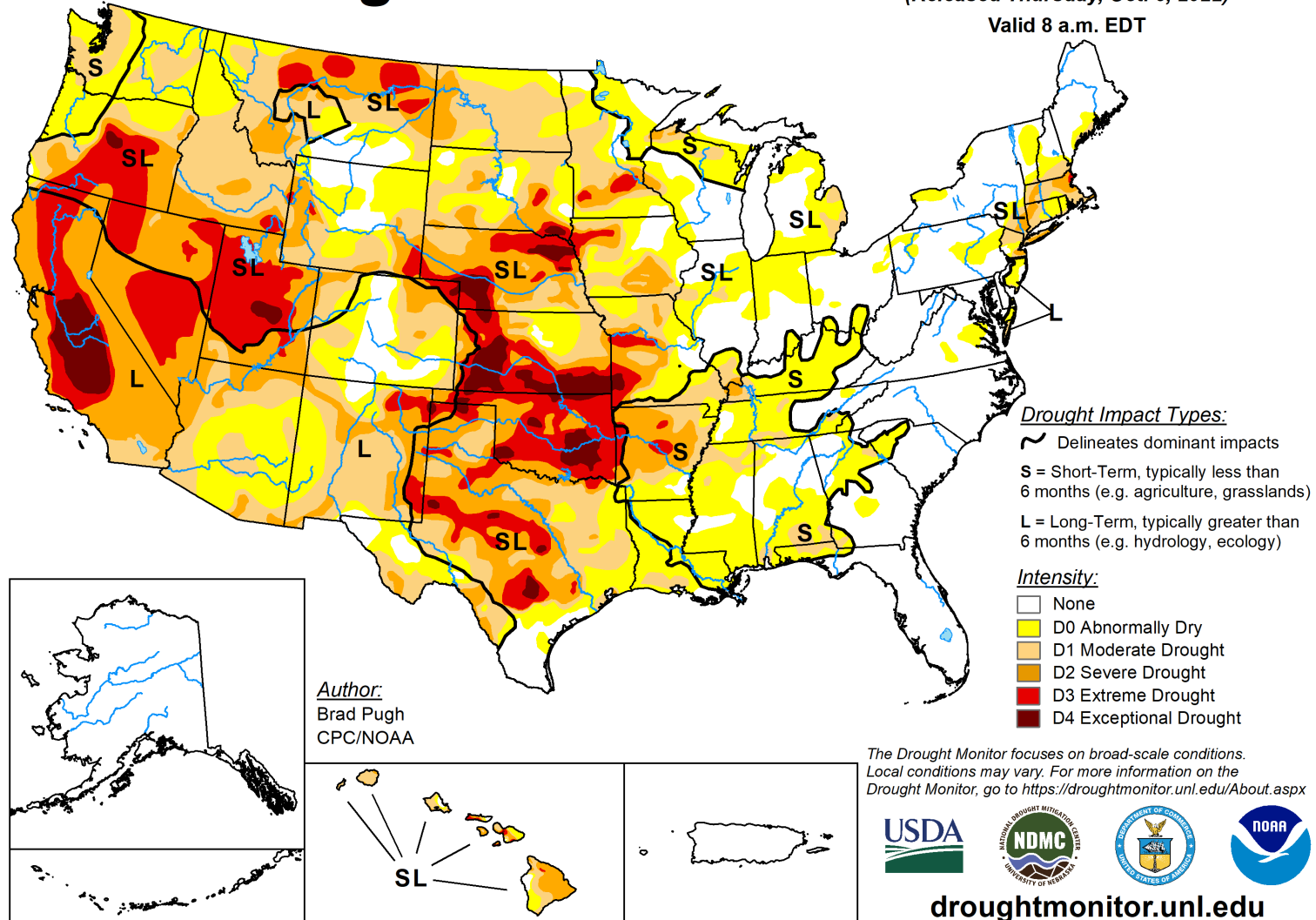
USDM

- State-of-the-art drought information system.
- Produces weekly drought maps for the entire US.
- Integrates multiple indicators through a “convergence of evidence” approach.
- The maps considers multiple variables including precipitation, soil moisture, temperature, stream water levels, lake water levels, snow cover, and meltwater runoff.
- Performs near-real-time validation of the map that involves an “expert” listserv of over 450 people.
- The experts contribute local data and information about impacts and also provide feedback on a weekly basis prior to the release of the maps.

Example USDM Map

U.S. Drought Monitor

October 4, 2022
(Released Thursday, Oct. 6, 2022)
Valid 8 a.m. EDT

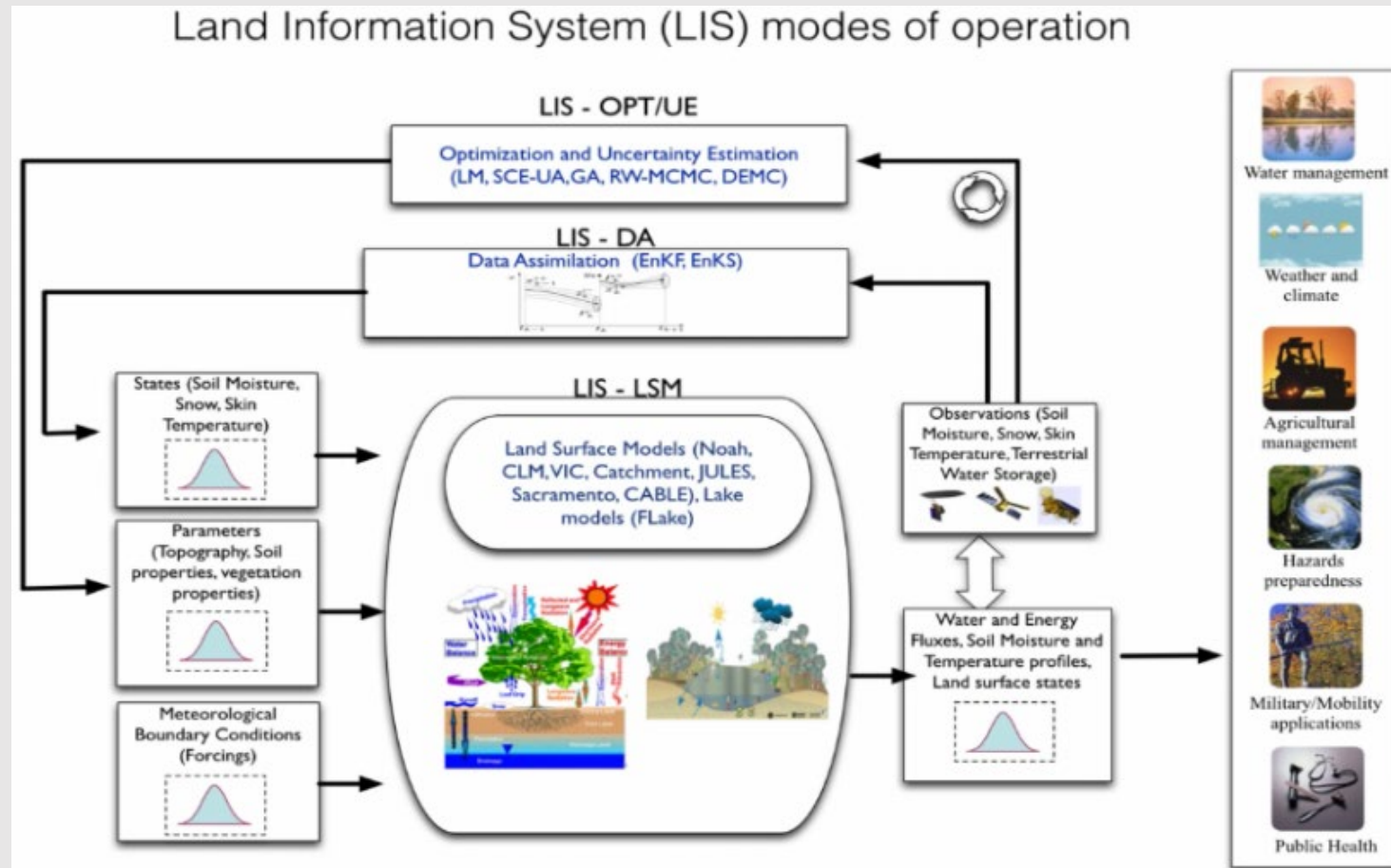


Need for this Project

- The current USDM is primarily based on inputs from unmanaged or natural systems and land surface conditions.
- The representation of hydrology is overly simplified and limited to point measurements.
- In this project we will add distributed hydrologic model outputs to the map.
- The performance will be further improved by through streamflow and land-surface data assimilation.
- The proposed addition will ideally help us produce a more accurate USDM map, especially for the long-term hydrologic droughts.
- We will be using two established platforms for this: NASA's Land Information System and NOAA's National Water Model WRF-Hydro.

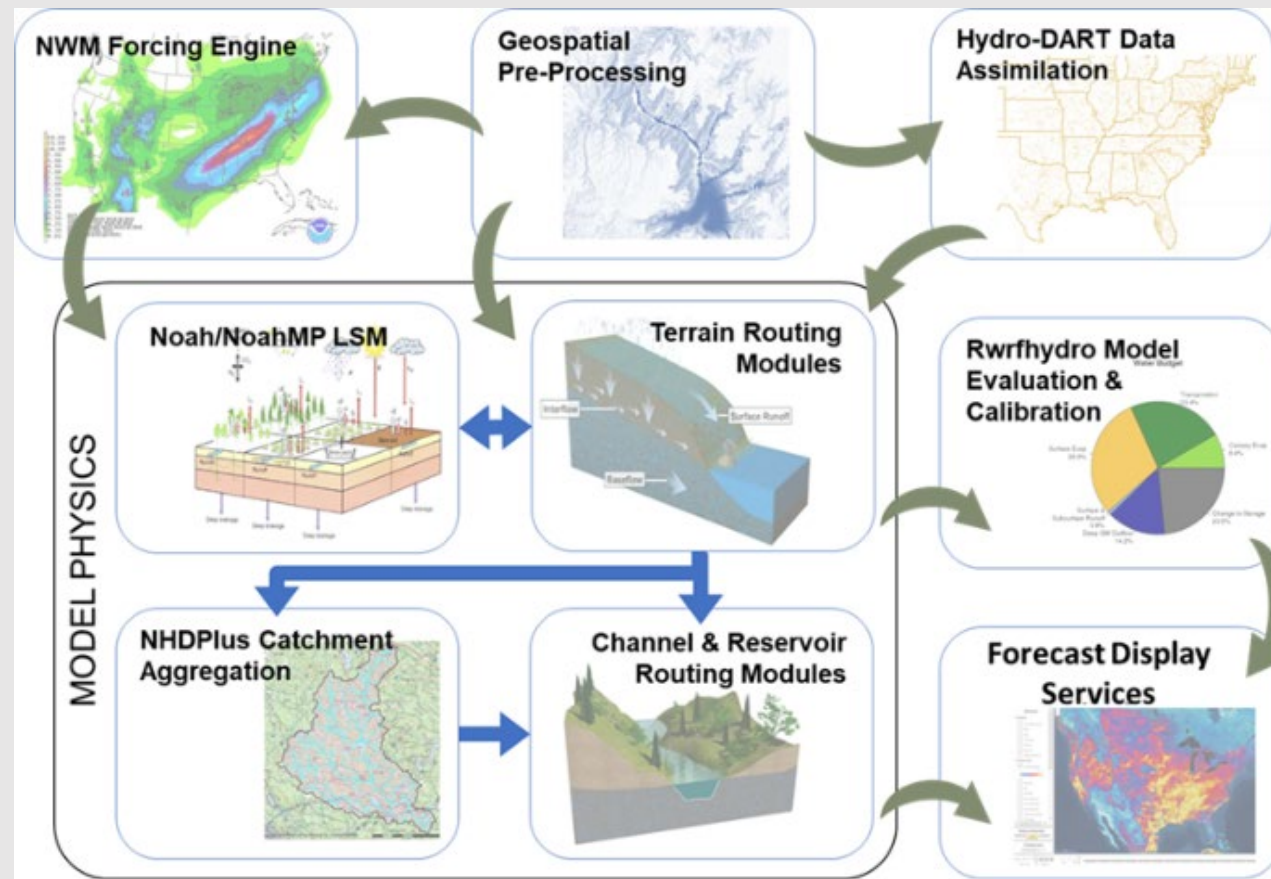
NASA LIS

Flexible land-surface modeling framework developed with the goal of integrating satellite- and ground-based observational data products and advanced land-surface modeling techniques to produce optimal fields of land-surface states and fluxes.

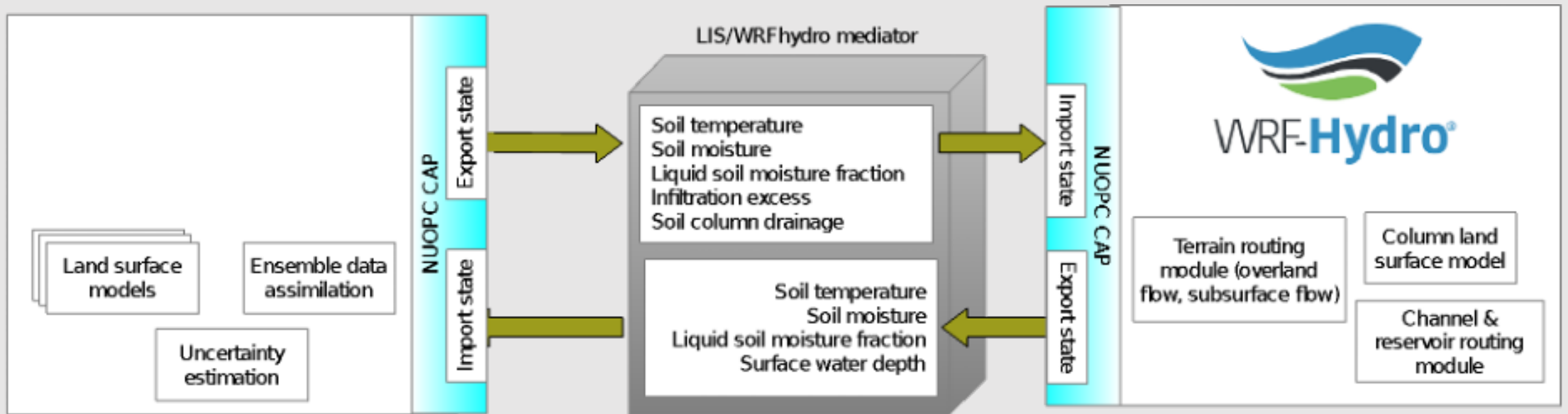


WRF-Hydro

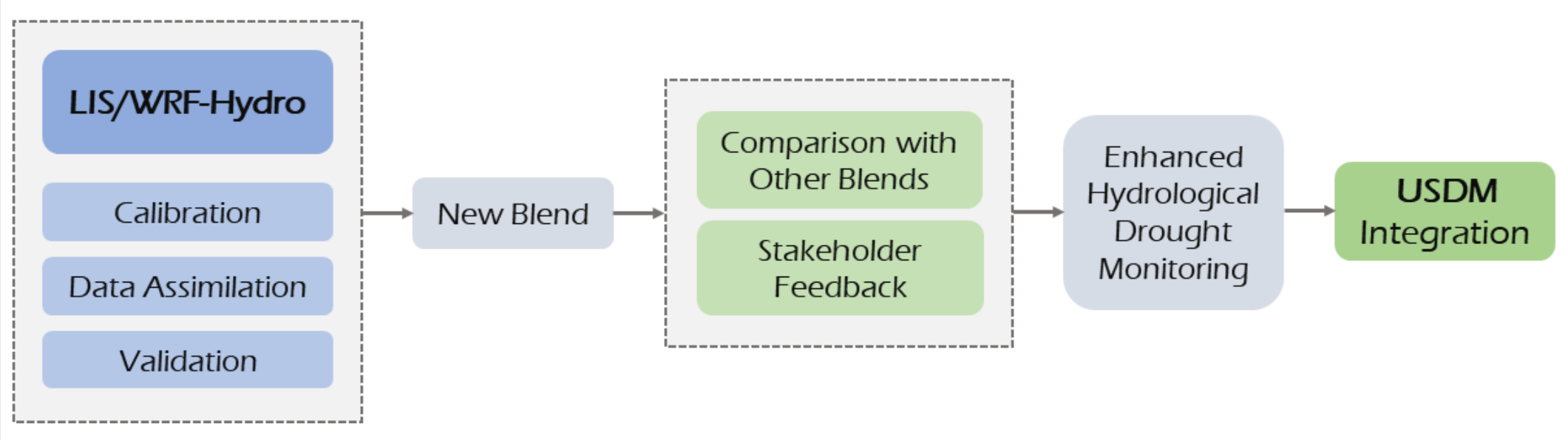
A hydrological modeling architecture that has been developed to facilitate improved representation of terrestrial hydrologic processes related to the spatial redistribution of surface, subsurface, and channel flow across and within the land-surface and to facilitate coupling of hydrologic models with atmospheric models.



LIS/WRF-Hydro



New Blend Integration



Project Phases

PHASE 1: Configuration of LIS/WRF-Hydro System

- *Configuration of LIS/WRF-Hydro model domains*
- *Calibration of LIS/WRF-Hydro parameters*
- *Evaluation of calibrated LIS/WRF-Hydro*
- *Evaluation of DA for LIS/WRF-Hydro*

PHASE 2: Integration of LIS/WRF-Hydro Blend within USDM

- *CONUS-scale simulation of calibrated LIS/WRF-Hydro*
- *Comparison against other blends within the USDM*
- *Integration of LIS/WRF-Hydro outputs in USDM*

PHASE 3: Efficacy Assessment of the Enhanced USDM

- *Setting up the operational prototype*
- *Survey to receive stakeholder feedback*
- *Incorporation of the stakeholder feedback*

Your Feedback

- 1. Impacts of hydrological droughts on your region/sector/community**
- 2. Identifying indicators/indices/data/information that correspond to these impacts**

Additional Considerations

- Specific characteristics of a blend that is geared towards hydrologic drought monitoring.
- Specific products useful for you to manage hydrological droughts.
- Any specific drought cases that are of interest.
- Any specific basins that are of interest.