Advancing Water Supply Forecasts in the Colorado River Basin for Improved Decision Making

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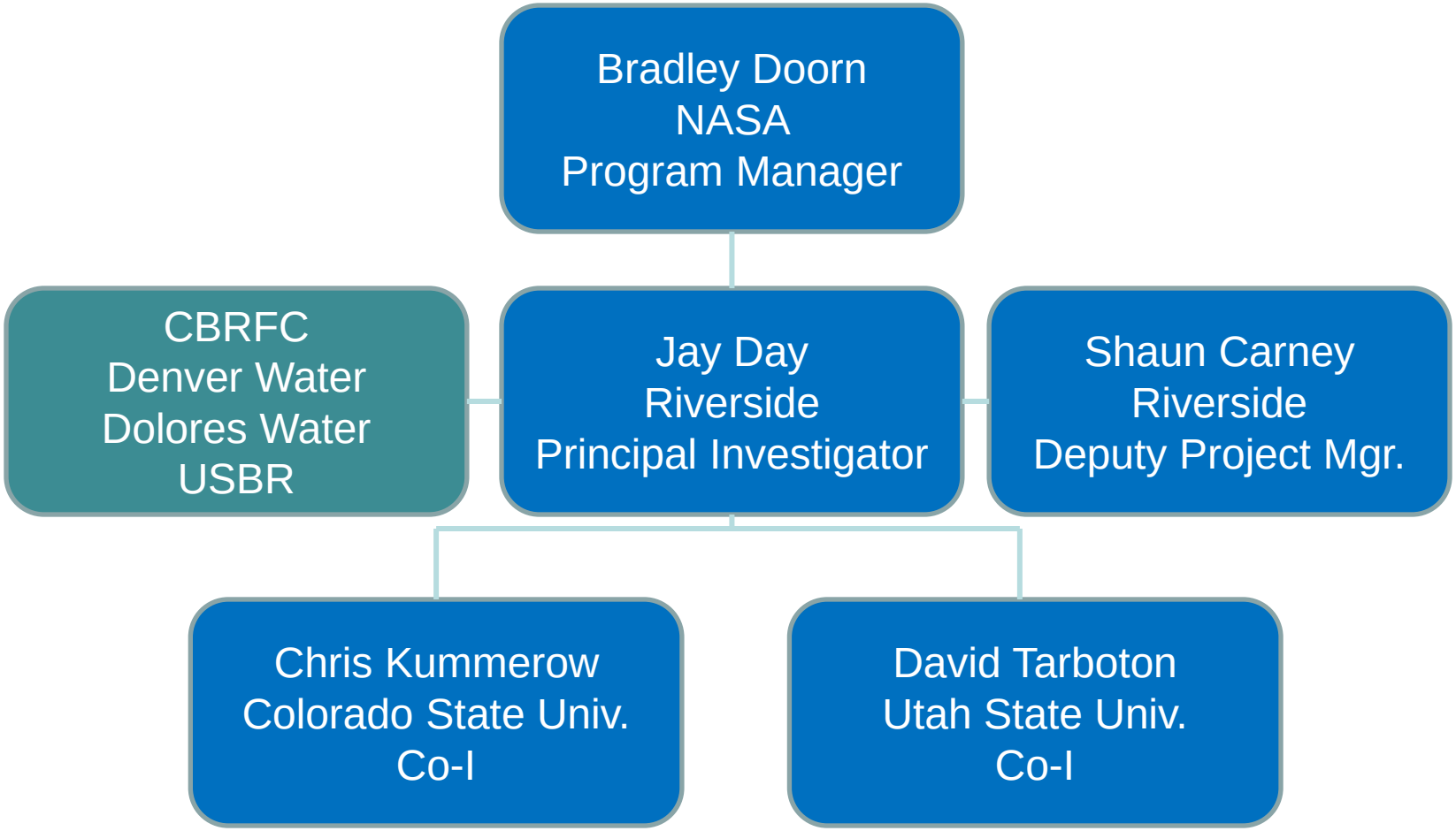
Opportunity

To Provide More Skillful Water Supply Forecasts with Uncertainty Estimates to Water Managers to Support Improved Decision Making

Project Team

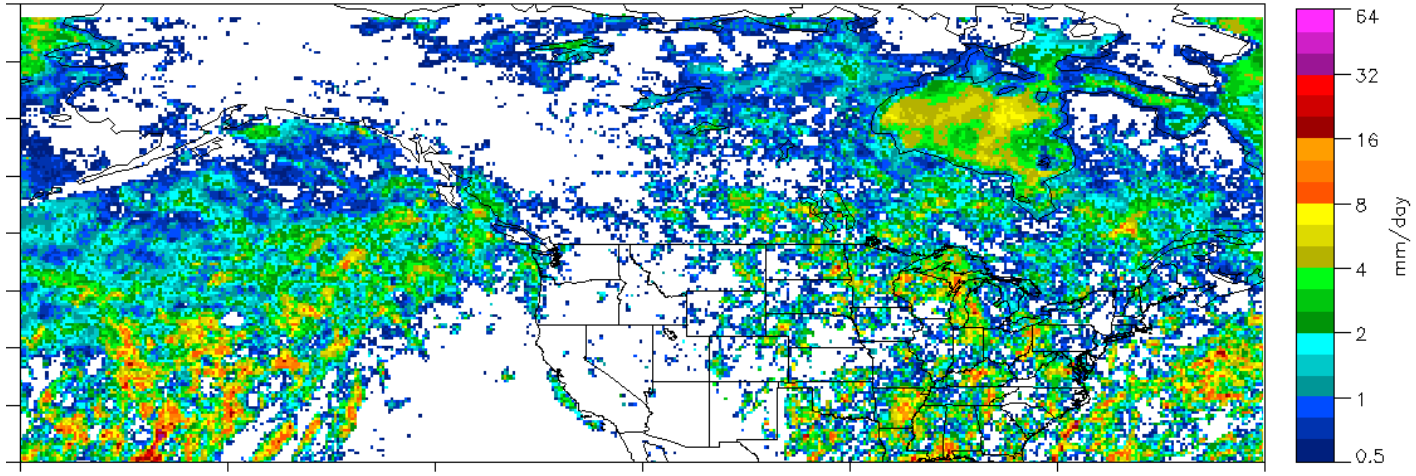


GPM Satellite Precipitation

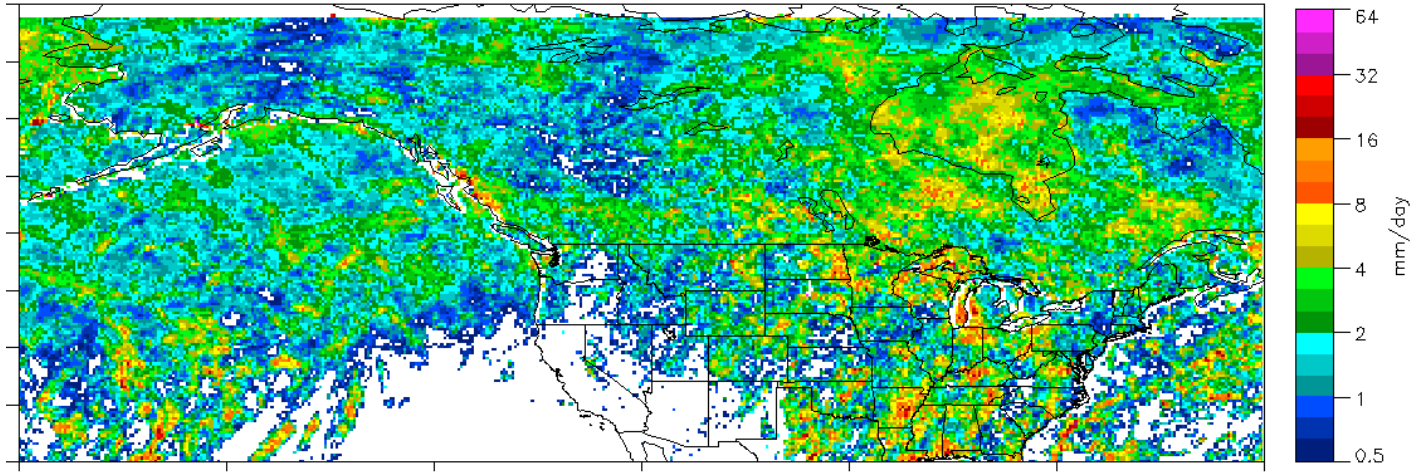
- One objective is to improve solid precipitation retrievals.
- Current passive microwave retrieval algorithms tend to mask snow covered regions.
- GPM uses a new Bayesian approach over land in which radiometers are trained by core satellite radar.

GPM-Trained Radiometer Retrieval - April, 2014

Pre-GPM rain estimate



Using GPM knowledge

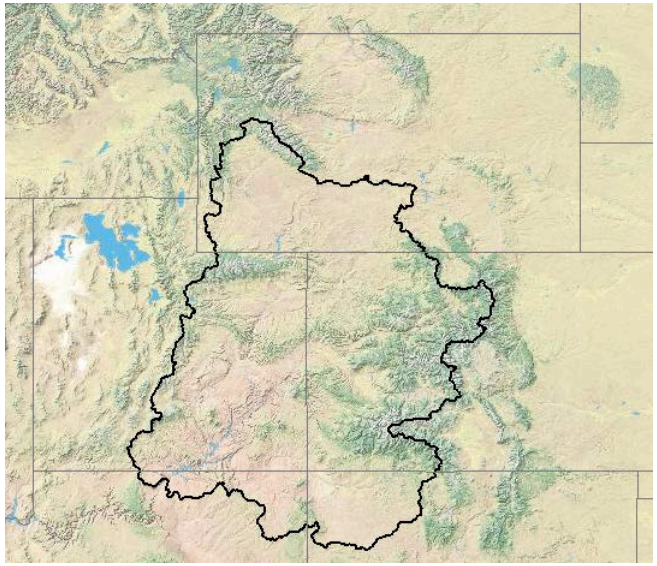


Satellite Precipitation (cont.)

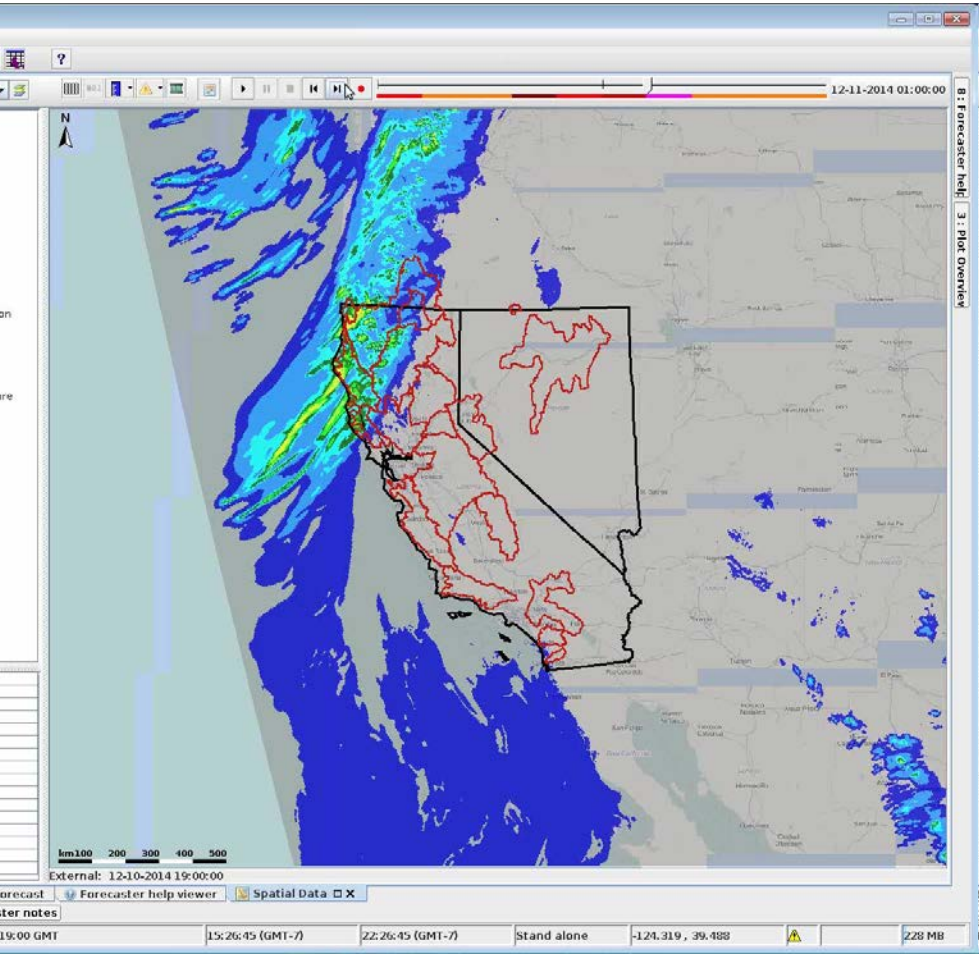
- Snow properties differ regionally. Will therefore develop an Upper Colorado River Basin training database for radiometer algorithm using
  - GPM core satellite
  - Ground based radar data tuned to in-situ

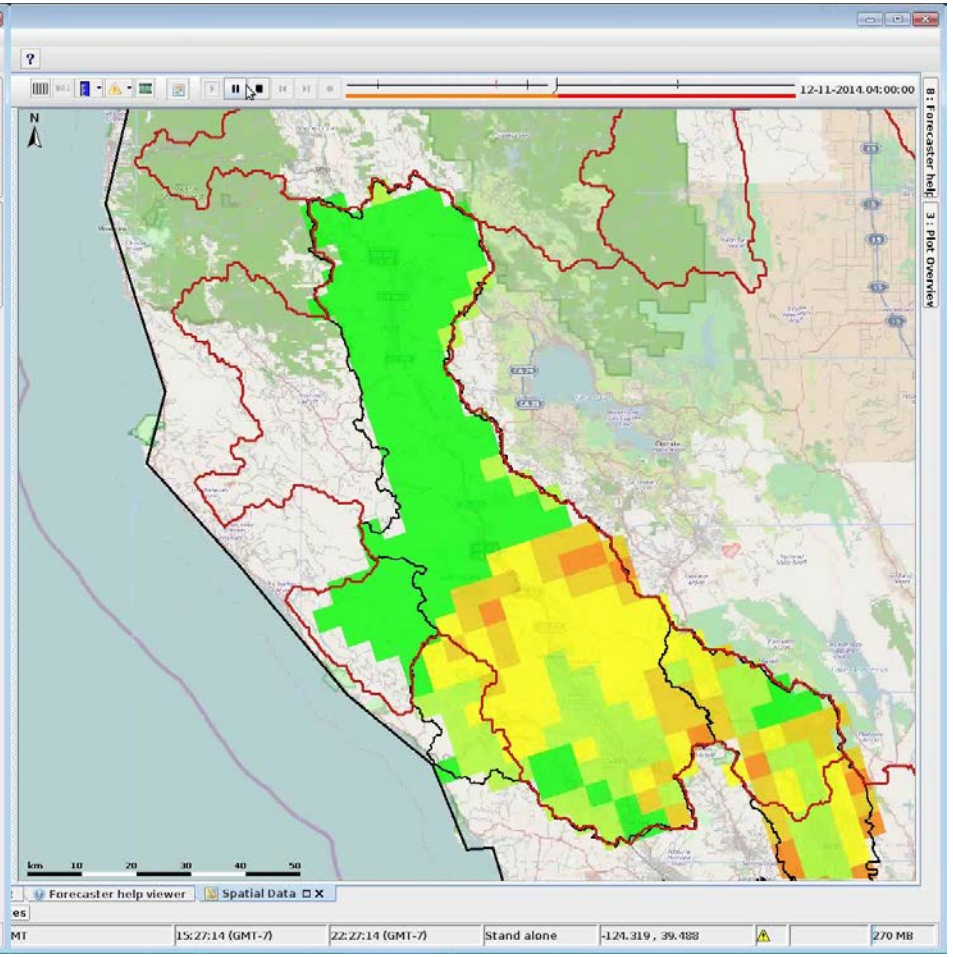
- GPM operational database is partitioned by near surface temperature and column water vapor. For this effort, will partition database by temperature and elevation.

- Additionally, will add radiometer derived SWE as a measure of consistency (e.g. confidence) in satellite products.



CHPS / RDHM Framework





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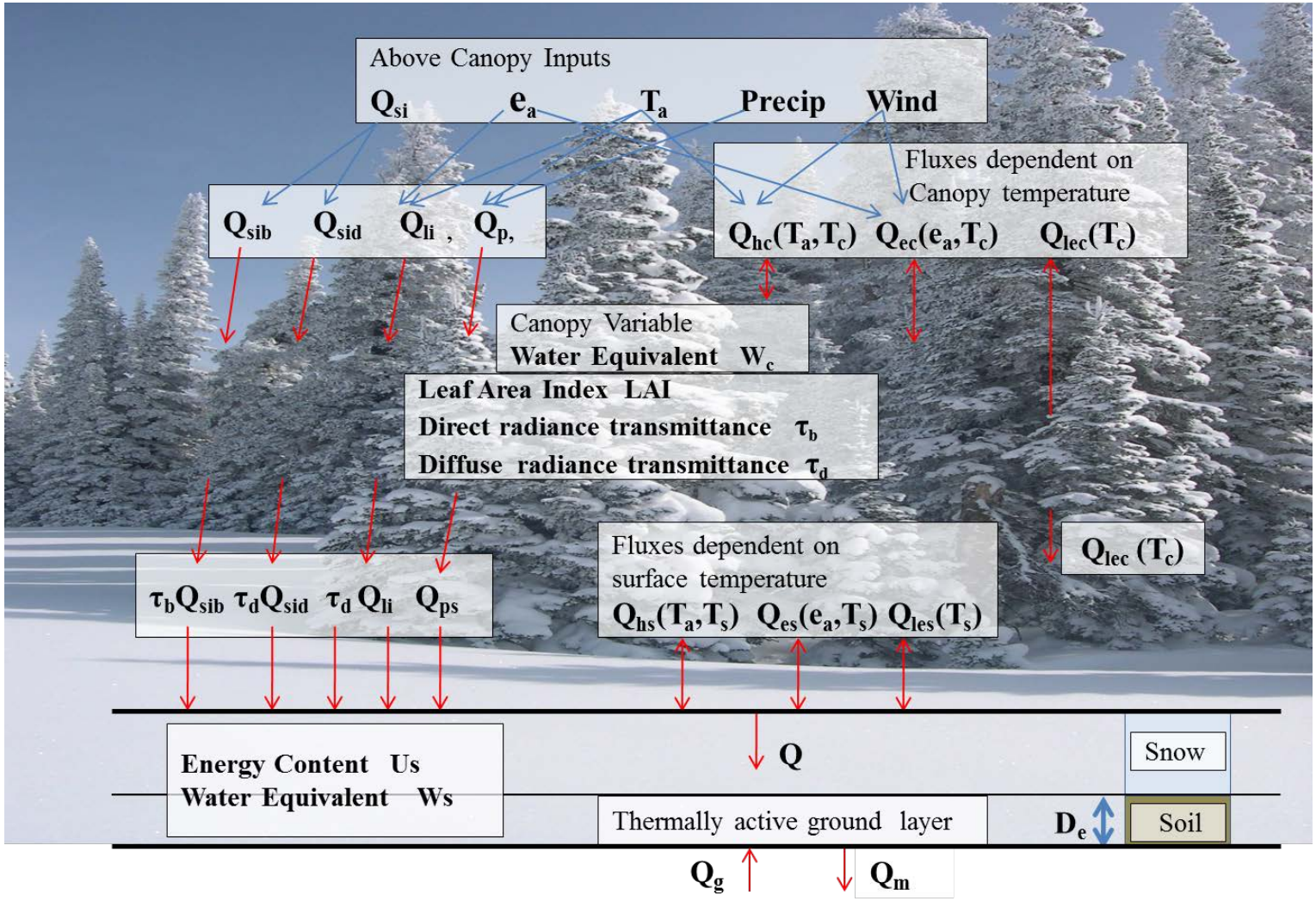
Utah Energy Balance Snowmelt Model

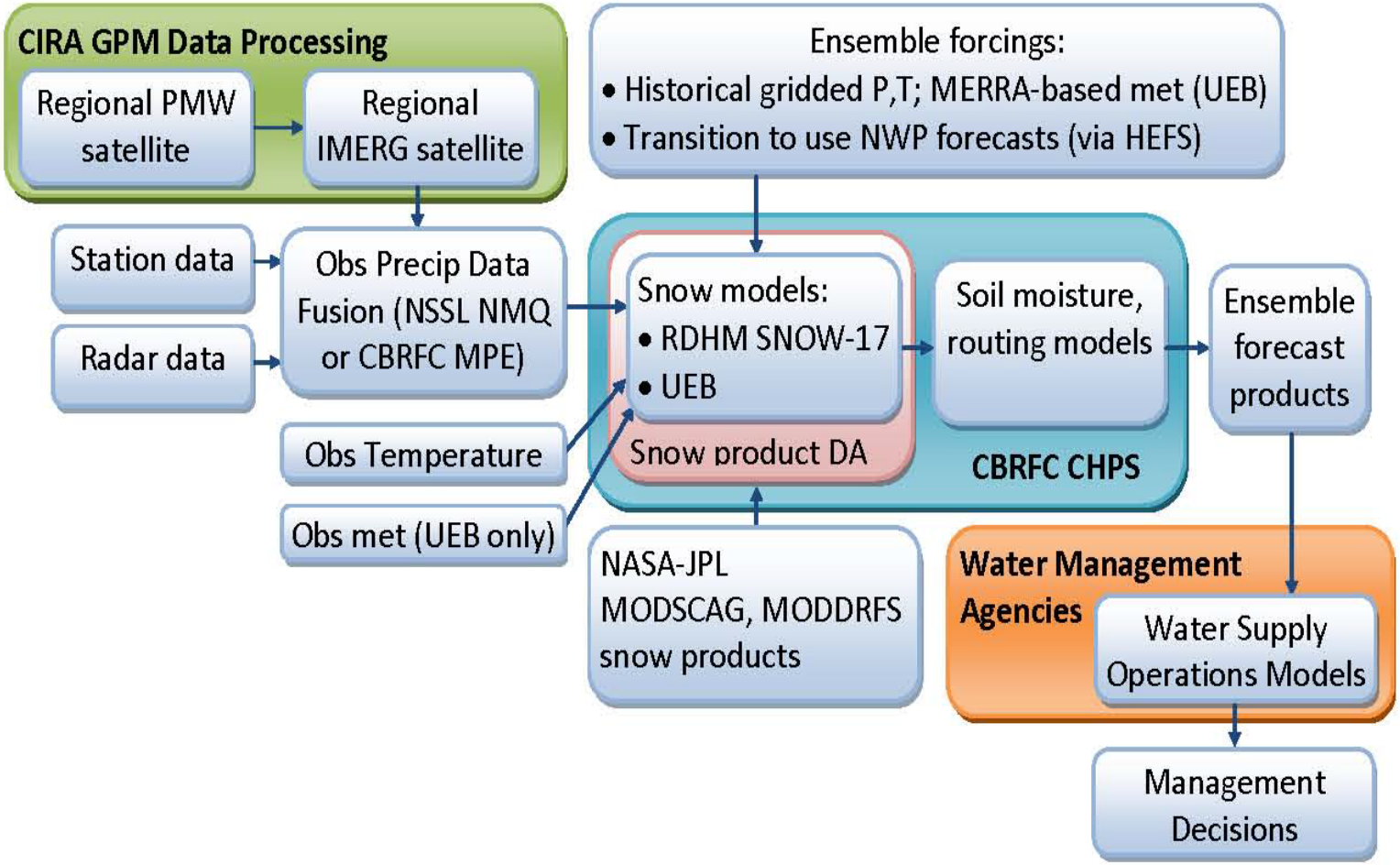


e.g. Mahat, V. and D. G. Tarboton, (2012), "Canopy radiation transmission for an energy balance snowmelt model," Water Resour. Res., 48: W01534, http://dx.doi.org/10.1029/2011WR010438.

UEB (cont.)

- Small number of state variables and adjustable parameters
- Physical basis reduces need for calibration and is more robust for prediction under conditions of non-stationarity
- Incorporation into CHPS to enable side by side examination of UEB versus index based Snow17 to quantify forecast skill for each model

Project Overview



Anticipated Impacts

- Improved Operational Water Supply Forecasts
  - Regionally Calibrated Satellite Precipitation Estimates
  - Distributed Hydrologic Modeling
  - Energy Balance Snow Model Evaluation
  - Snow Data Assimilation

- Improved Water Management Decision Making
  - Skillful Forecasts with Uncertainty Estimates
  - Reforecasts for Verification and Development of System Operating Rules

Transition Strategy

- Make CBRFC a Partner
  - Leverage local knowledge
  - Collect constant feedback
  - Shared ownership

- Work Closely with Water Managers
  - Understand system/tradeoffs/decision making process
  - Demonstrate value of the forecasts

Lessons Learned - TBD

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