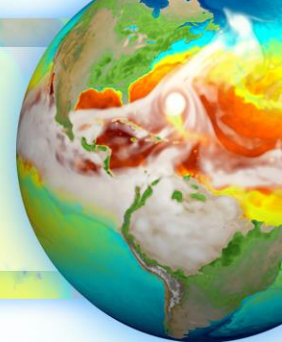


# E3SM V2 model developments



- MOSART - water management
- MOSART - inundation

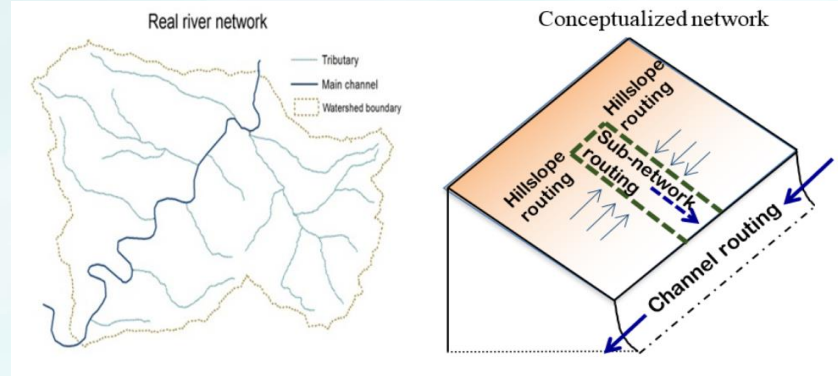
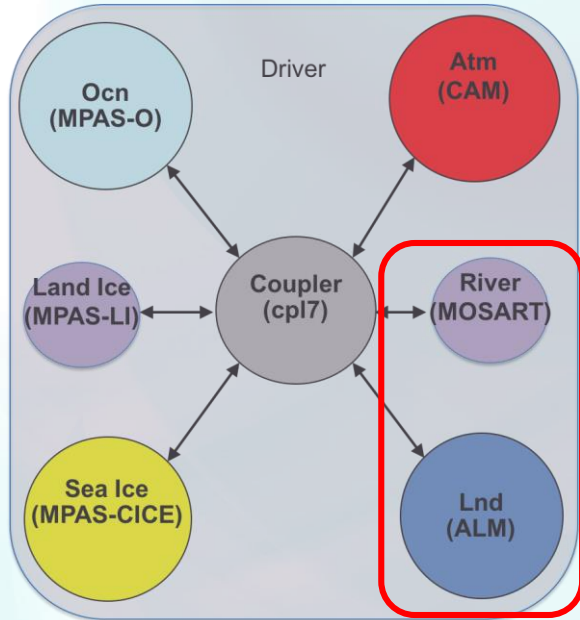
Tian Zhou

Pacific Northwest National Laboratory

# Brief review of the river model in E3SM

In E3SM phase 1, the original river model RTM (River Transport Model) has been replaced by MOSART (Model for Scale Adaptive River Transport)

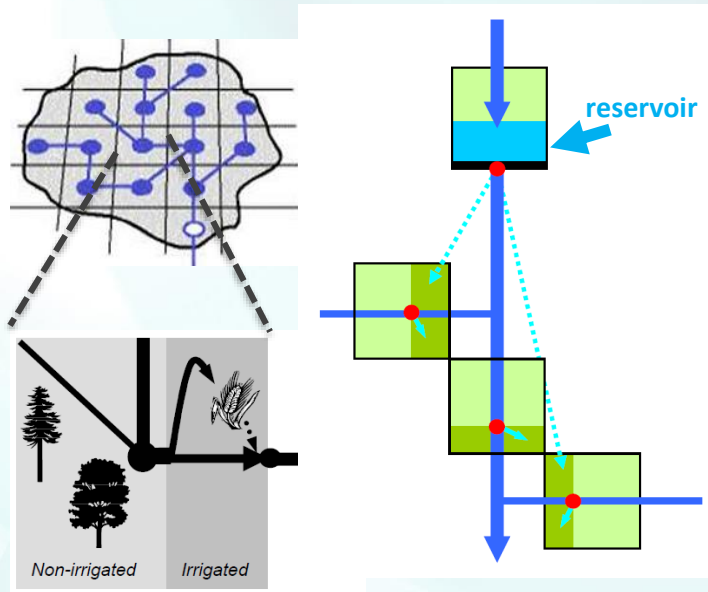
Hong-Yi Li et al. (2013, 2015)



- Hillslope, subnetwork, and main channel
- More physically based algorithm

# Water Management model built upon MOSART

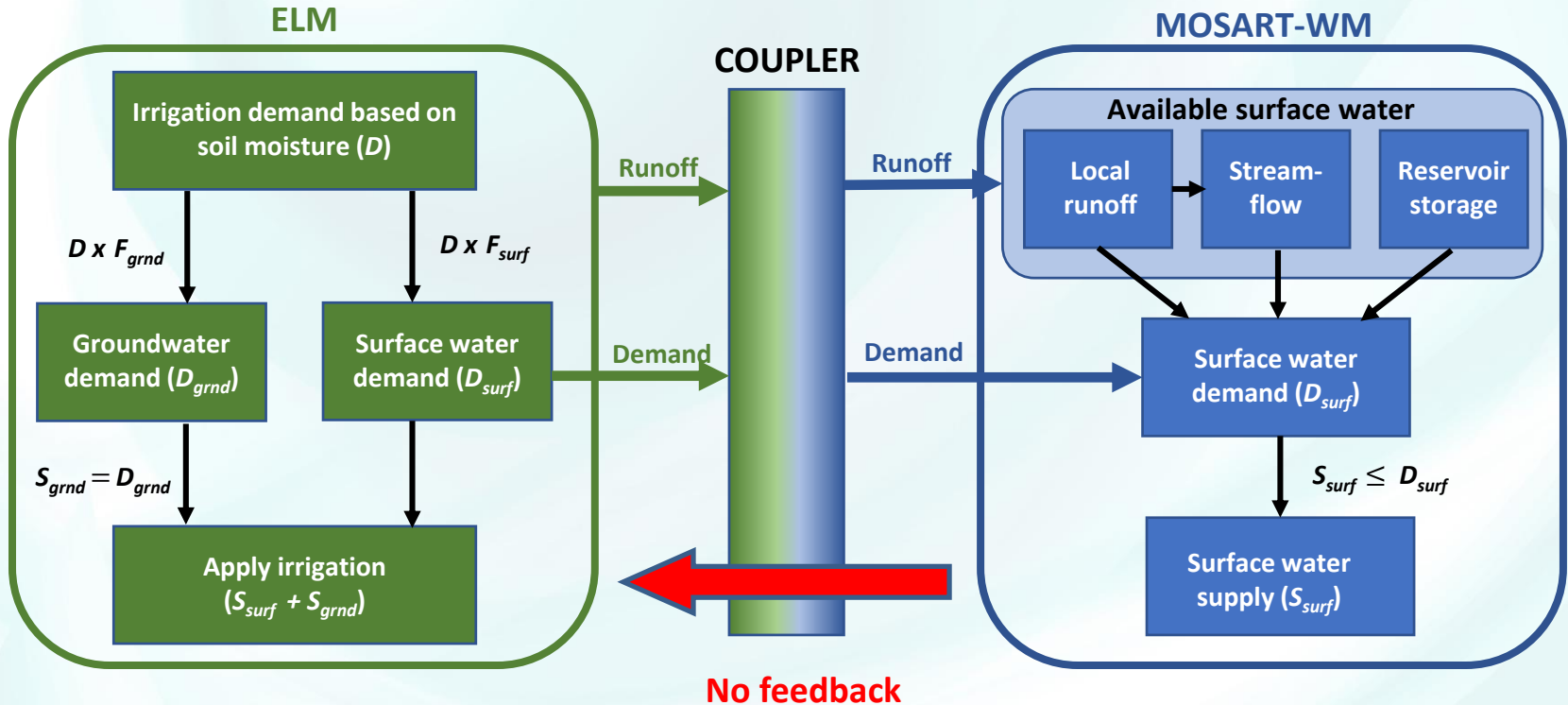
A Water Management (WM) model was developed to represent the irrigation water withdrawal and dam regulations.



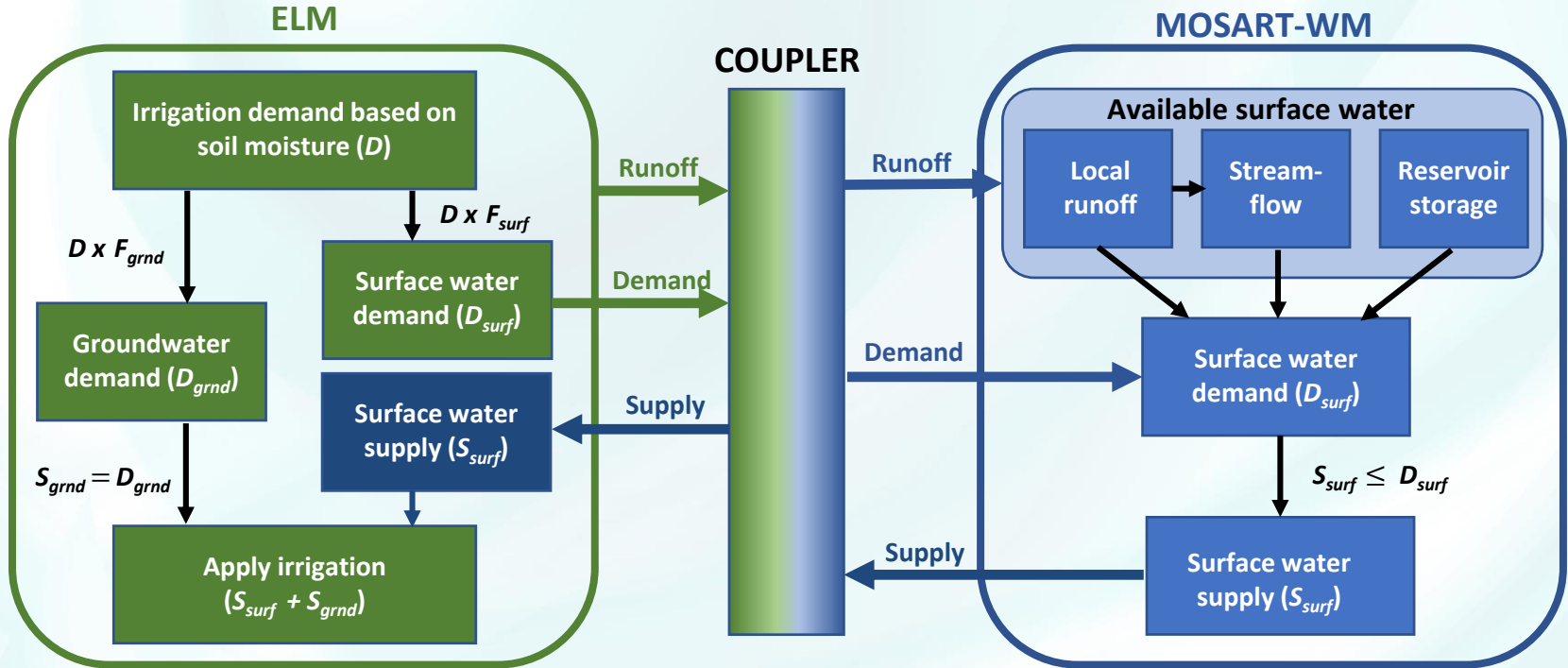
- **Spatially distributed sectoral water withdrawals**
- **Rules-based reservoir releases:**
  - Irrigation
  - Irrigation and flood control
  - Flood control and others

• (Voisin et al. 2013, 2017)

# One-way coupled irrigation scheme between ELM and MOSART-WM

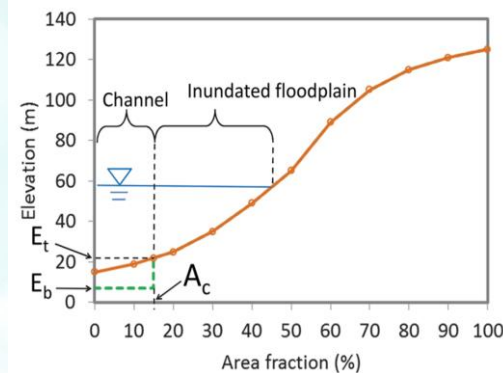
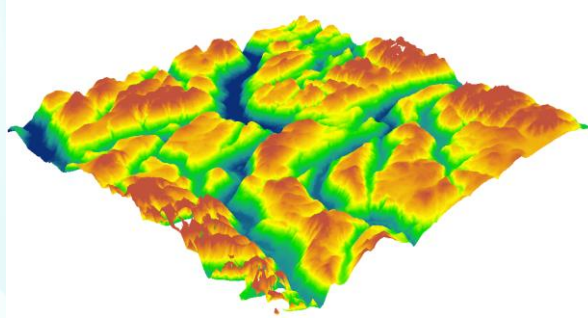


# Two-way coupled irrigation scheme between ELM and MOSART-WM

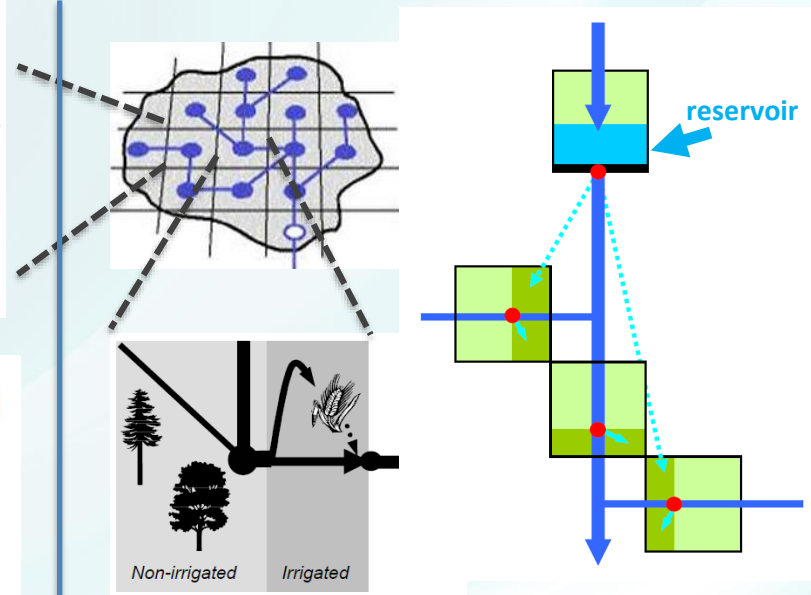


# Inundation model built upon MOSART

## Inundation model



Elevation profile derived based on DEM



## Water management model

A floodplain inundation model was coupled with MOSART to represent flood extent based on river discharge, channel geometry, and DEM

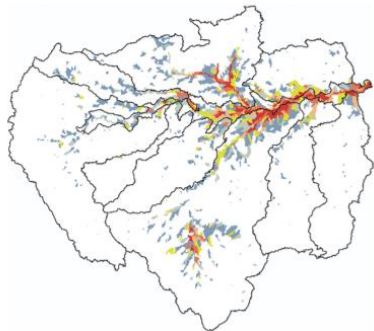
Luo et al. (2017)

# MOSART-inundation application in Amazon Basin

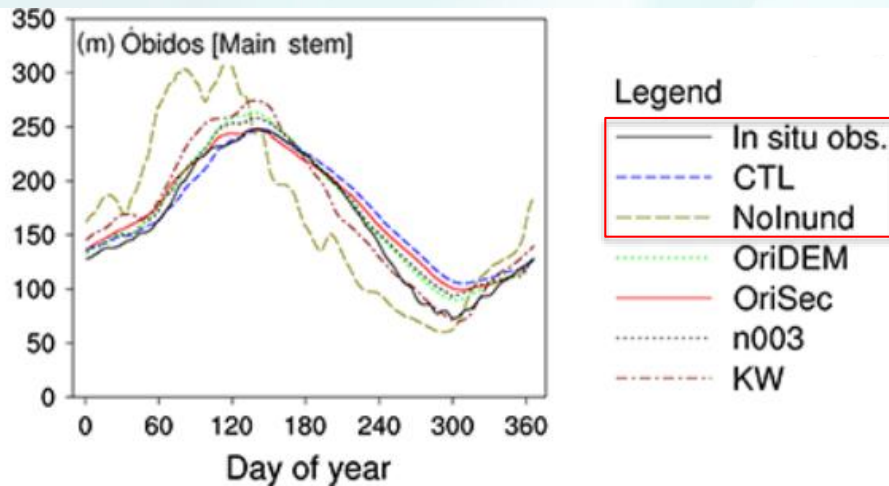
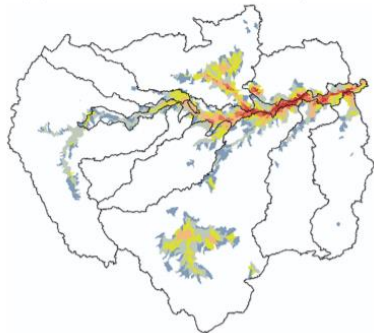
simulation

satellite observation

(a) Control simulation (AMJ)



(c) GIEMS observations (AMJ)



River discharge (\*1000 cms) near the outlet of the basin

- Inundation model is able to capture the spatial pattern of the flood fraction**

- Magnitude and timing of the river discharge is better captured with inundation**

Luo et al. (2017)