MOSART-sediment

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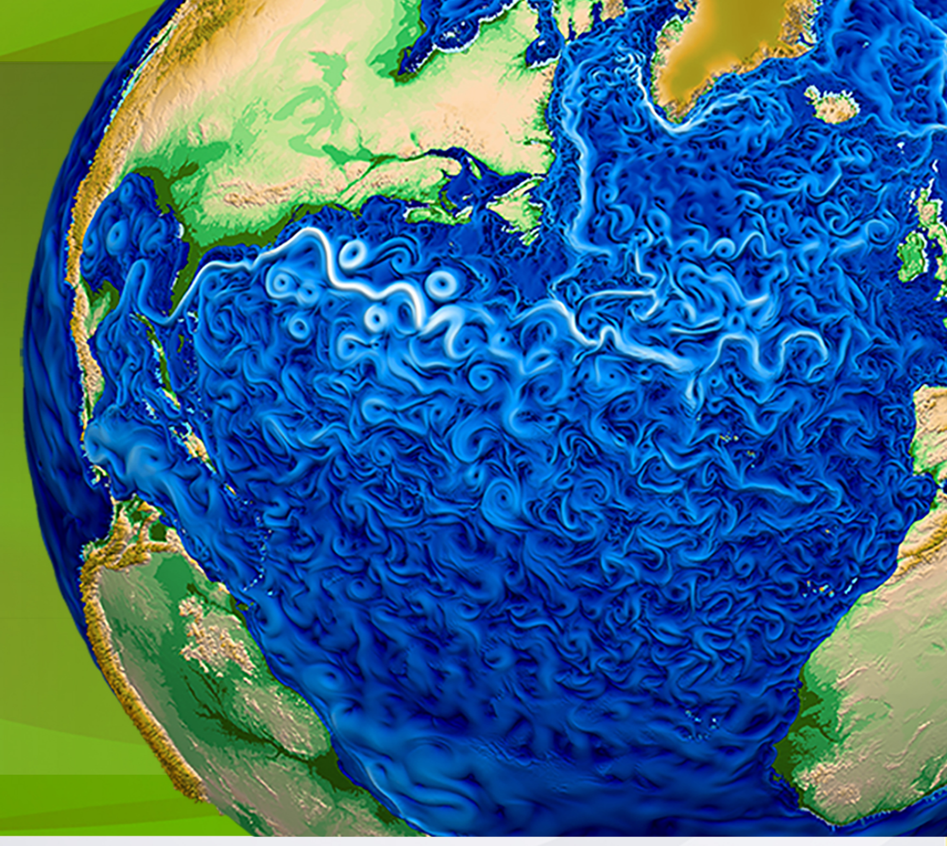
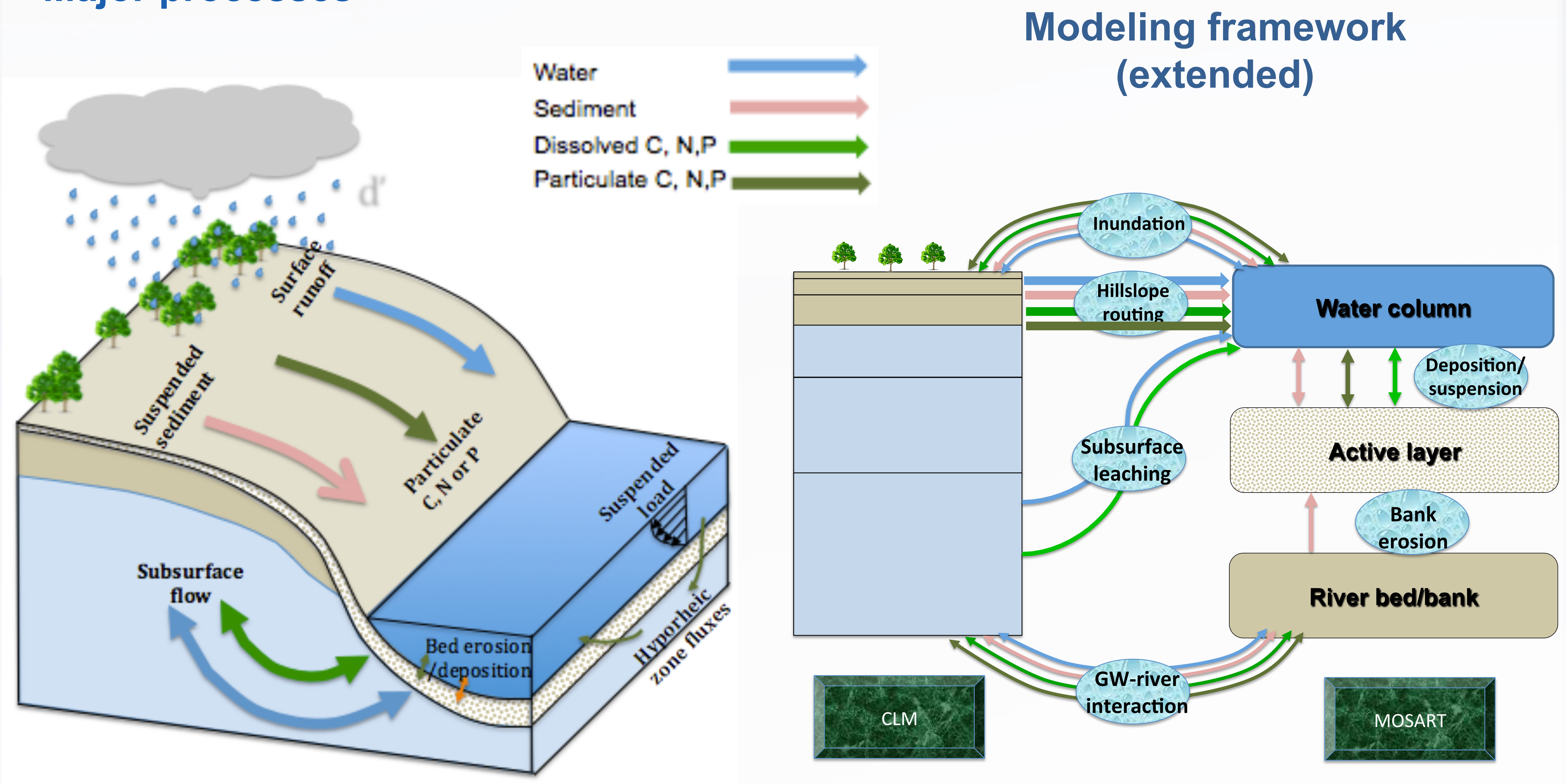


Objective

Represent the overland and in-stream erosion, deposition and transportation of Processes of suspended (fine-particle) sediment, in order to facilitate the related transportation of C, N and P (primarily organic) in particulate form

Approach

Major processes



Key assumptions (not changed in near future)

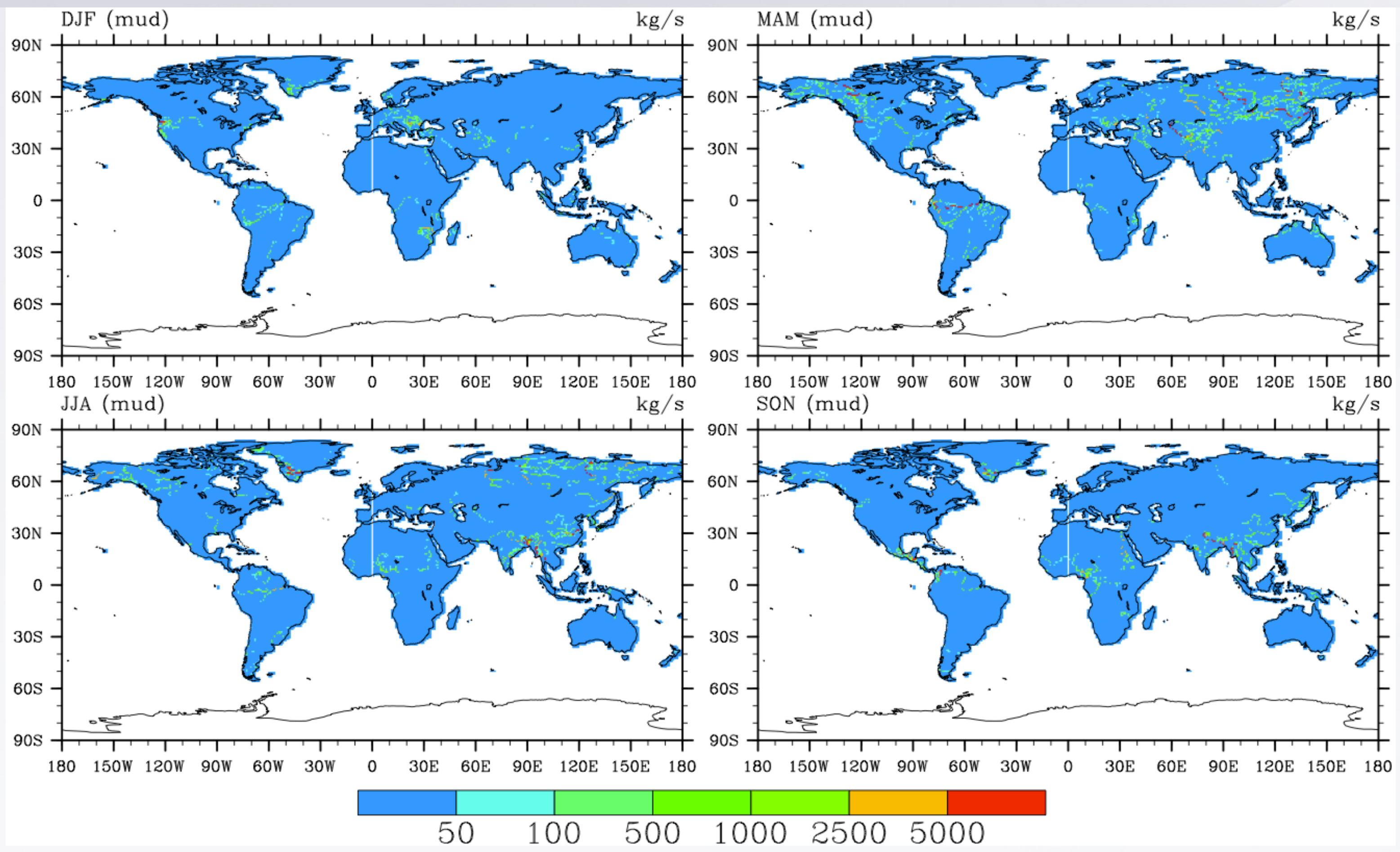
- ✧ Only two types of suspended sediment are included, mud and sand (grain size ~ 0.35mm)
- ✧ Mud supply comes from hillslope, bed and bank erosion, while sand supply only comes from bed and bank erosion
- ✧ Mud and sand supplies are constrained by water fluxes only
- ✧ Changes to topography and geomorephology are not considered

Major simplifications for the early results (future opportunities!)

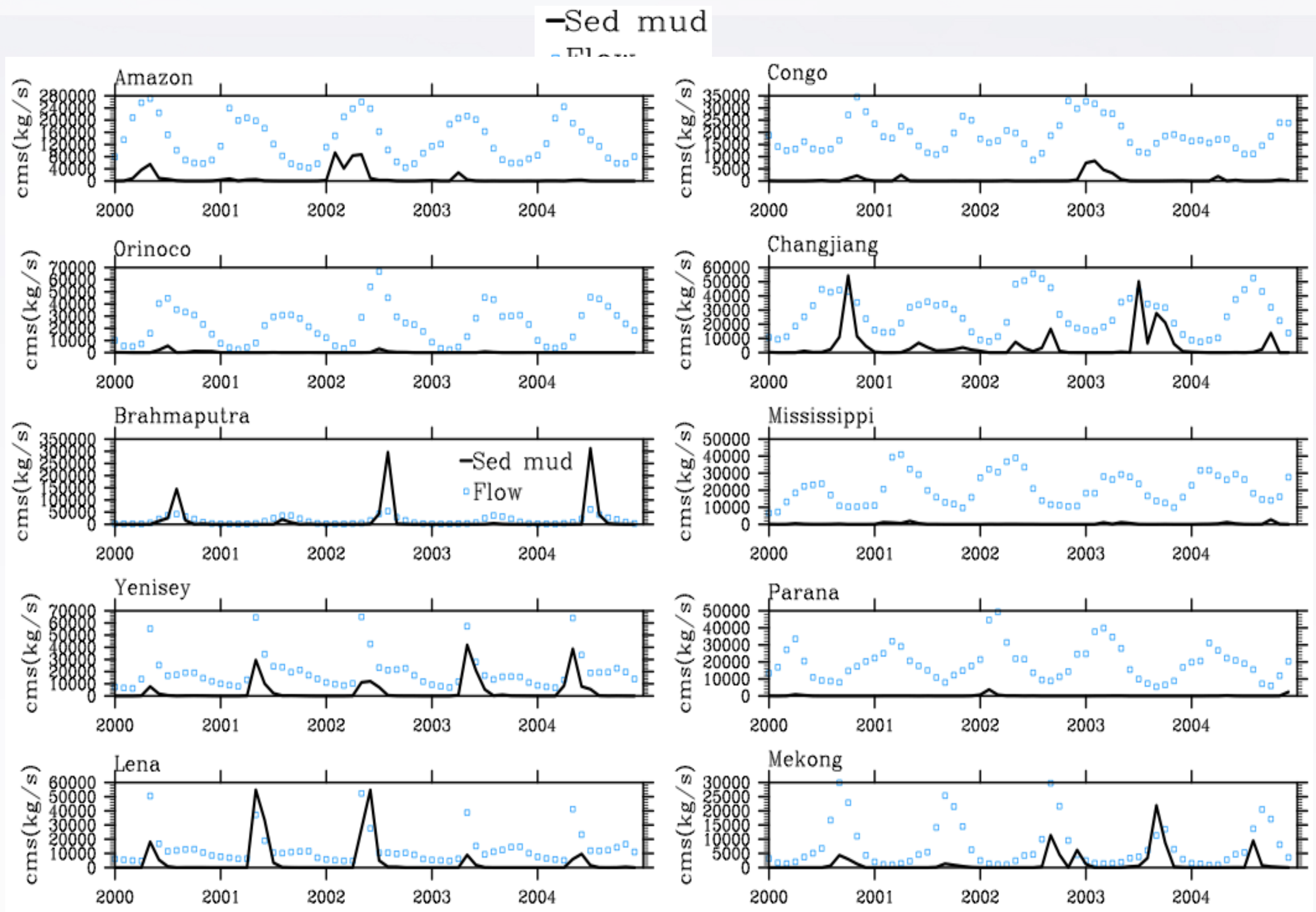
- ✧ Hillslope soil erosion rate currently a function of runoff only, effects of soil properties and landuse not incoporated
- ✧ Effects of reservoir regulation and trapping mechanisms not included.
- ✧ Rectangular channel geometry (→ trapezoidal/circular channel geometry)

Evaluation data

- ✧ World River Sediment Yield Database by FAO (873 rivers)
- ✧ M&F05 database by James Syvitski et al (2007, 488 rivers)



Simulated global map mud sediment (2000-2004)



Simulated monthly sediment fluxes from top 10 large rivers

Impact

- ❖ **MOSART-sediment lays the foundation for modeling transportation and transform of particulate C, N and P through rivers into the ocean to close the global C, N and P cycles**
- ❖ **Modeling and evaluating river BGC provide important constraints for simulating the soil C, N and P balance in ACME-CLM**
- ❖ **Building on MOSART-sediment, groundwater-river interaction in the hyporheic zone can be represented to improve modeling of surface water-groundwater interactions**

ACME Accelerated Climate Modeling for Energy
climatemodeling.science.energy.gov/acme

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