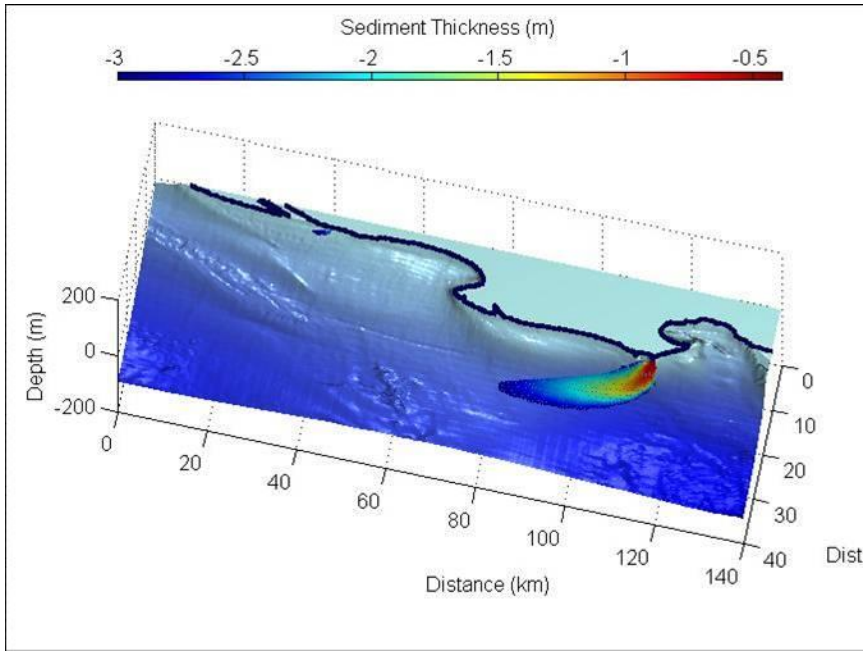
Modeling of delta processes: a web-based toolbox

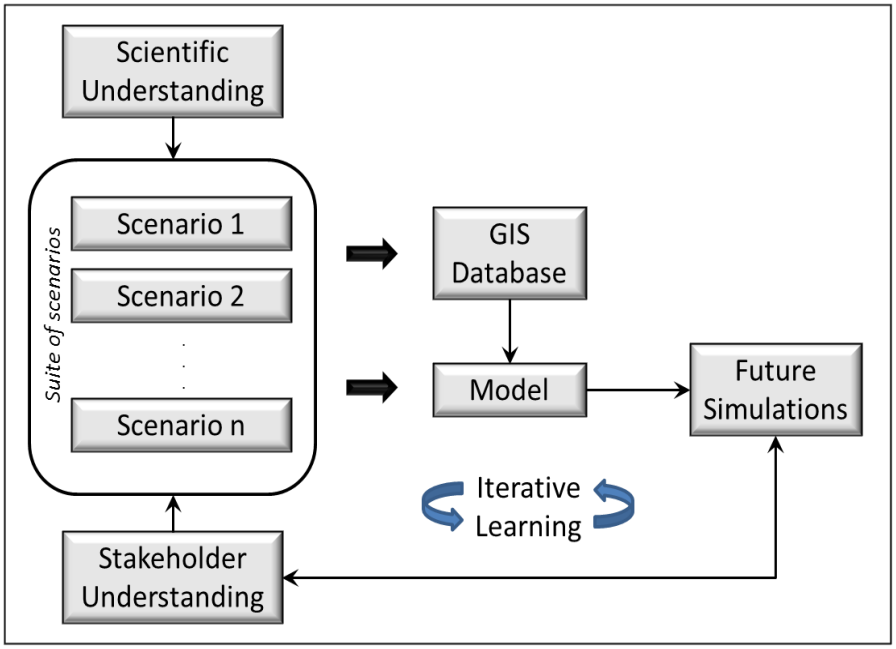


Irina Overeem

CSDMS, University of Colorado at Boulder, USA

Belmont Forum DELTAS Project

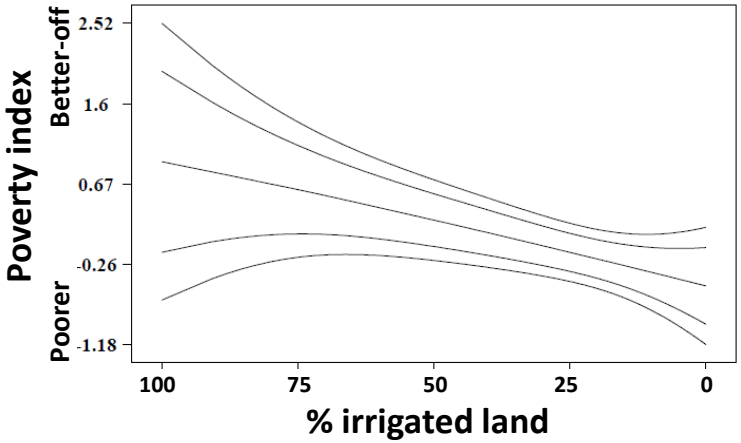
DELTAS initiative coordinates and enhances the development of a science-based framework for delta sustainability and risk assessment



Conceptual model allows tight integration of data, models and feedback loops

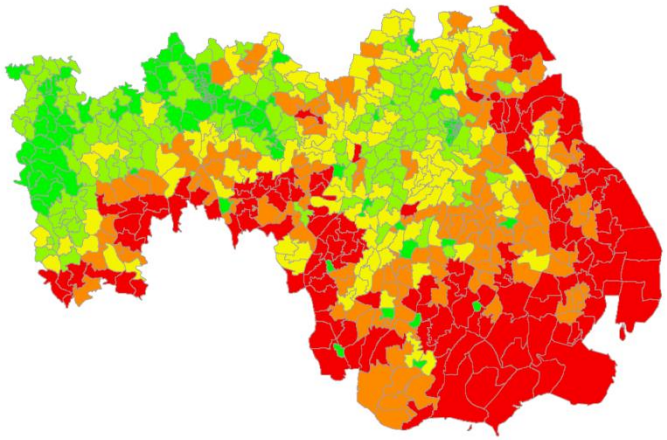
GIS Modeling

- Searching for **associative relationships** amongst:
  - land use/land cover,
  - environmental quality and
  - Poverty (based on Census data)



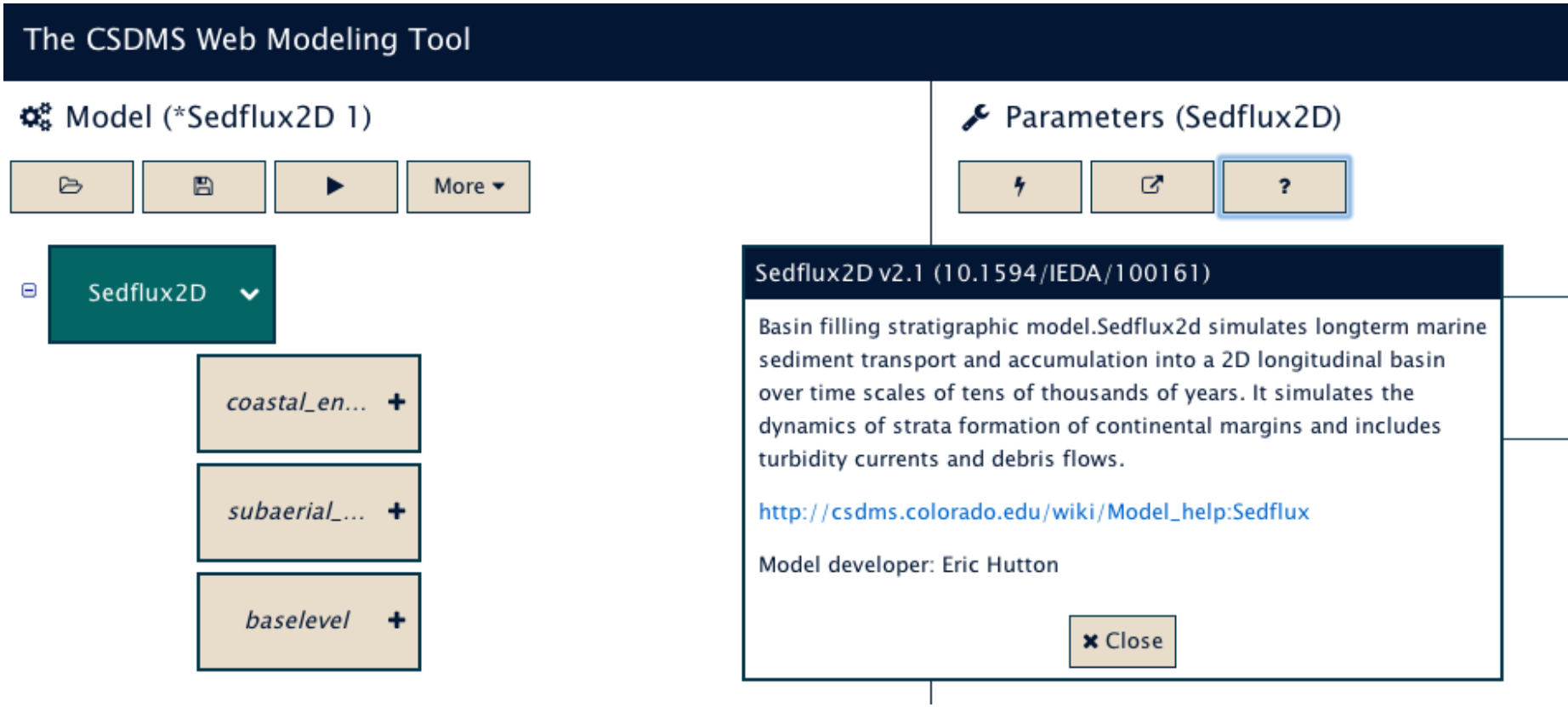
- considers spatial dependence and spatial heterogeneity

- uses a variety of techniques:
  - Spatial autocorrelation techniques
  - Multivariate logistic regression models
  - Bayesian Geoadditive Semiparametric (BGS) logistic regression model



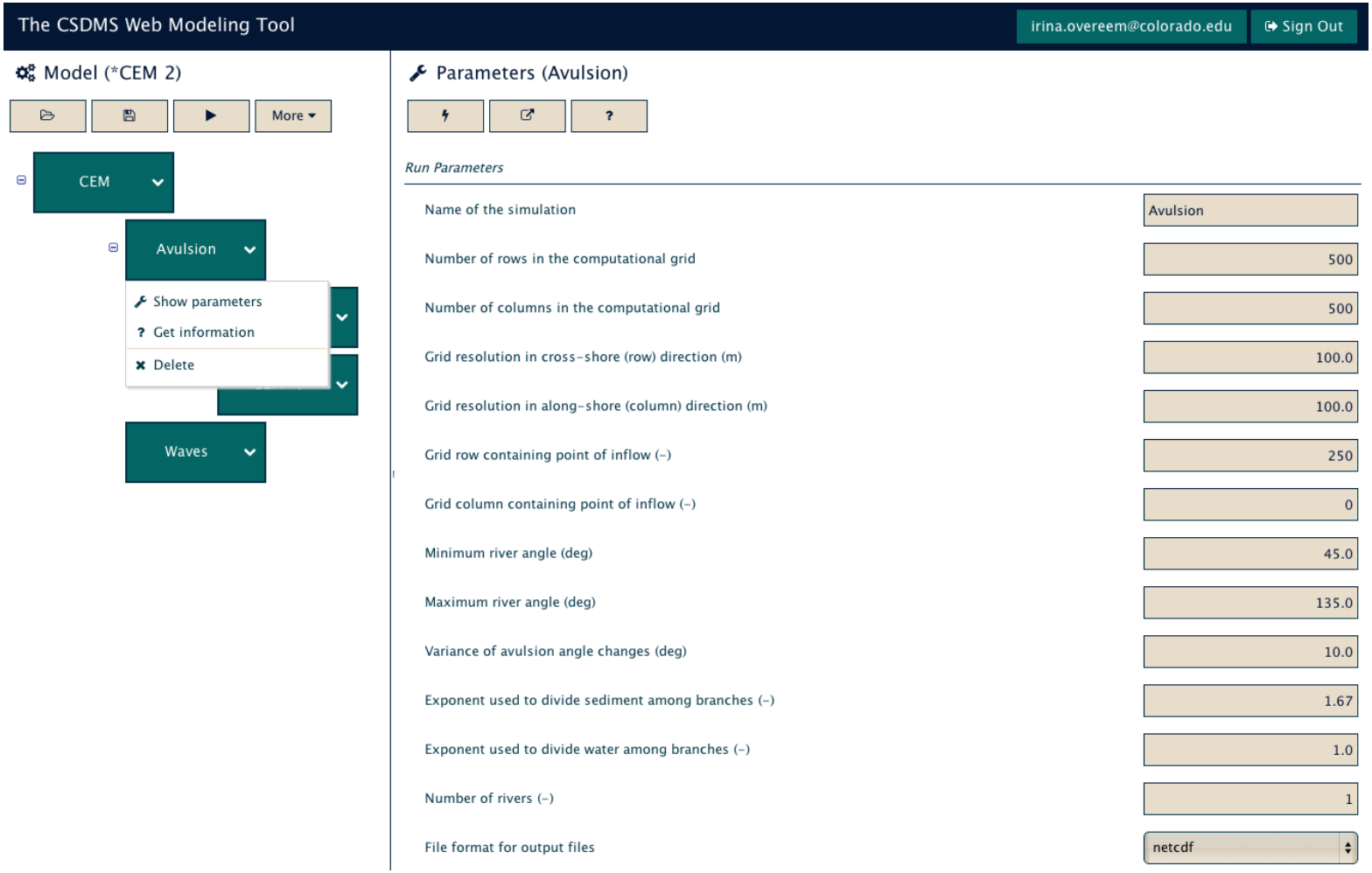
From: Lazar et al, 2014, CSDMS meeting presentation

WMT web-based modeling tool

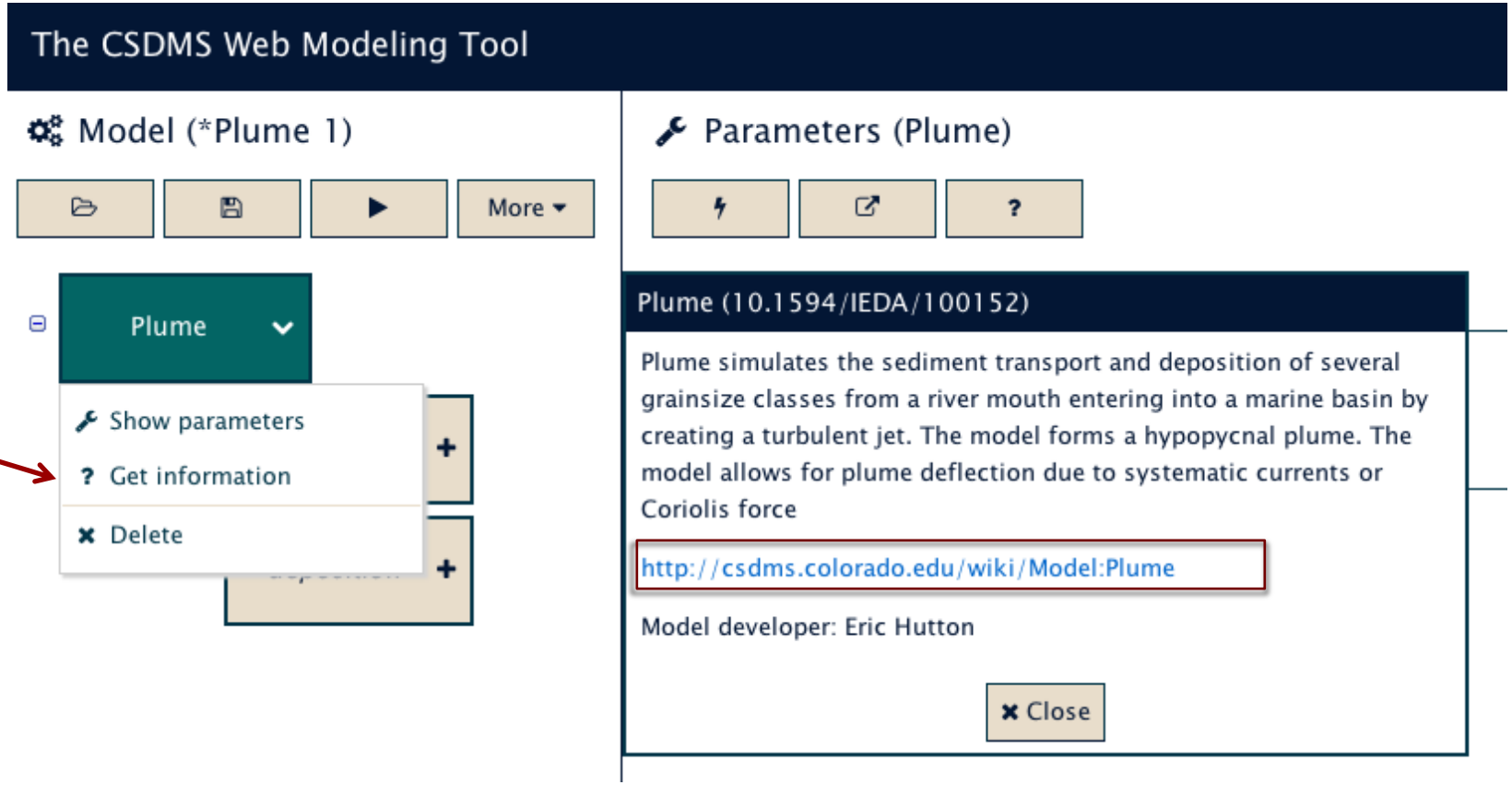


Data sharing through Irods, combined with CSDMS Web-based Modeling Tool
This example shows a stand-alone model.

Data and Model Coupling



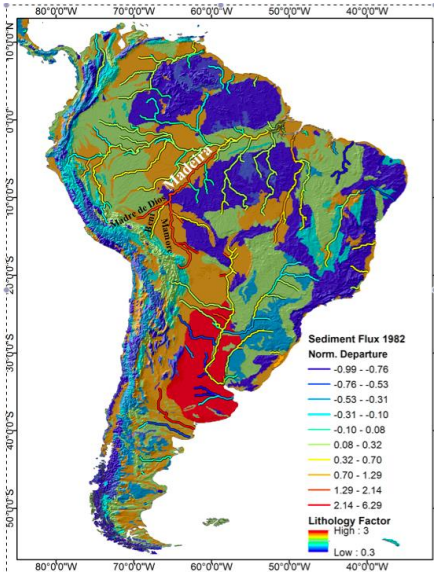
Integration between WMT and wiki



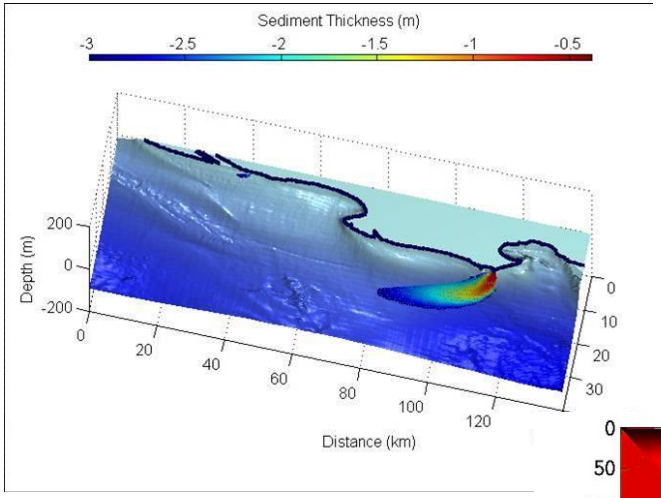
Click here

A couple of relevant models

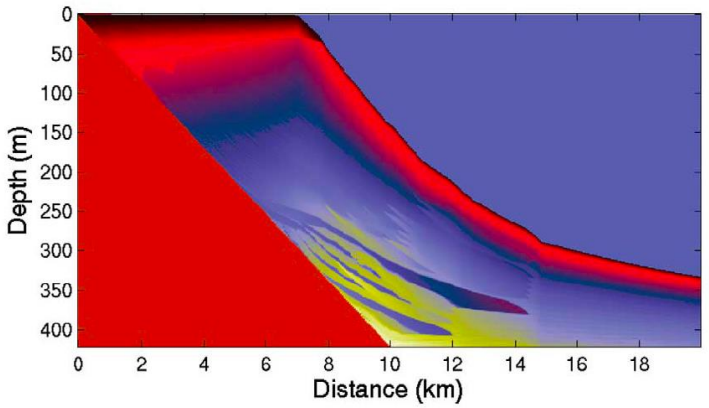
River-basin sediment



River-marine Plumes

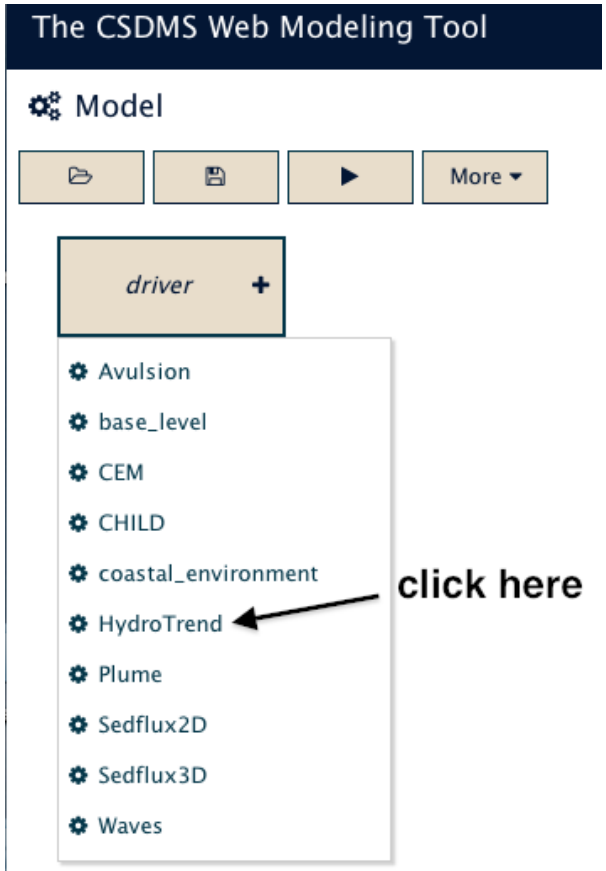


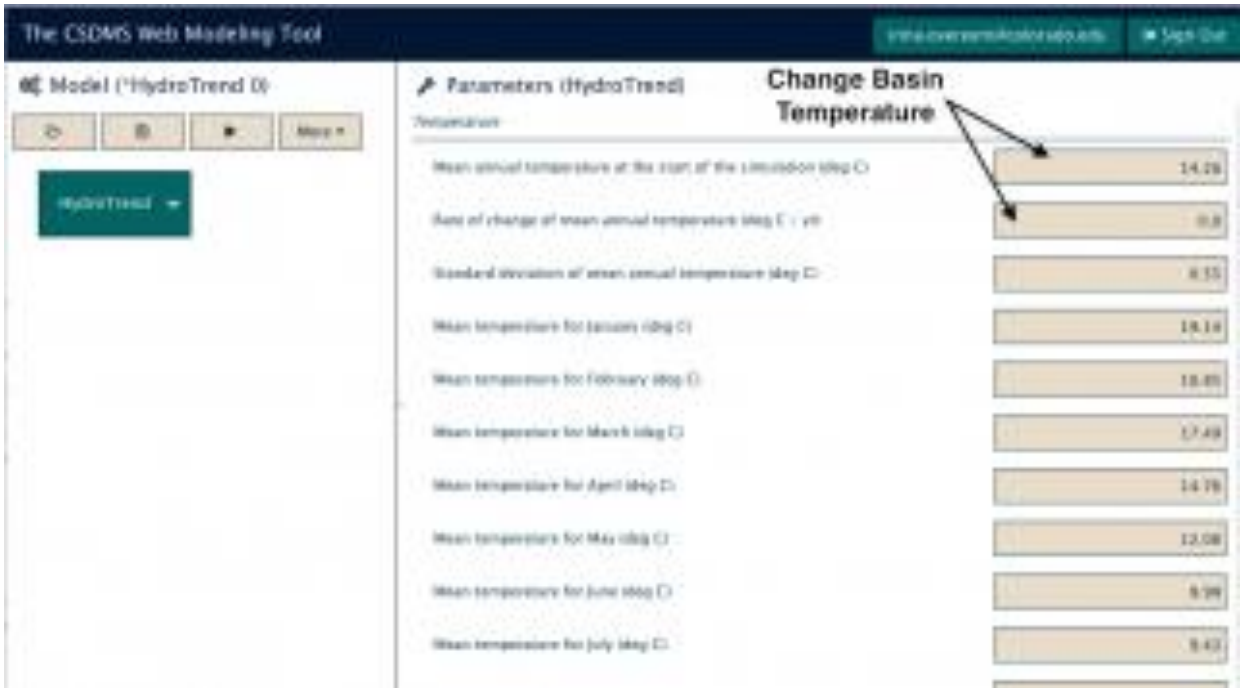
Sediment Failures



Upstream-downstream coupling

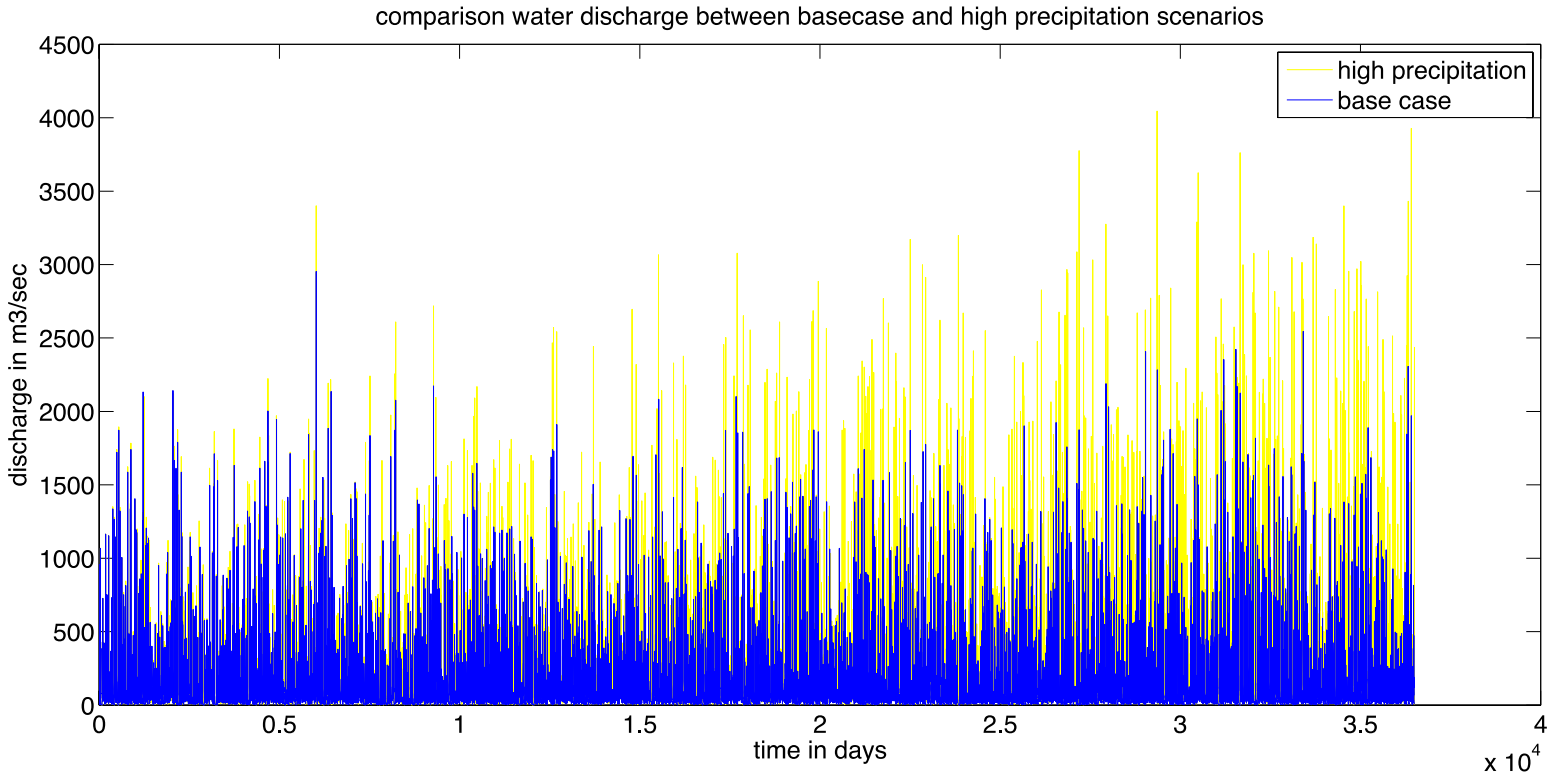
HydroTrend in WMT



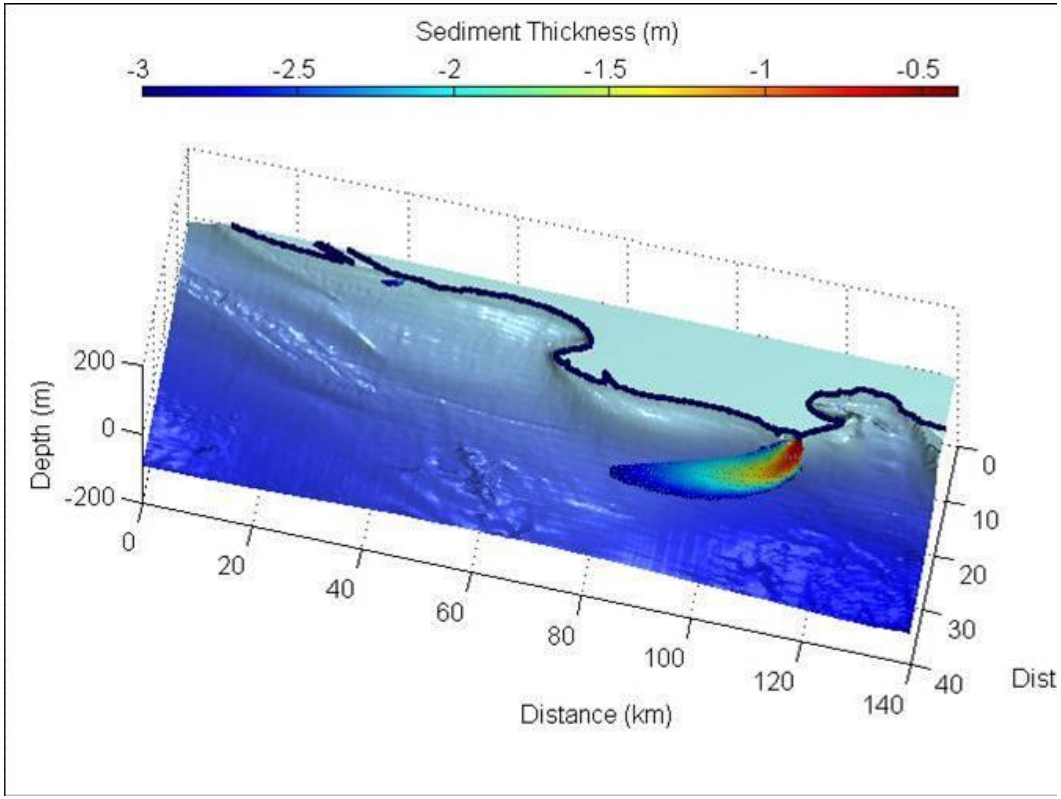


HydroTrend models basin-wide water and sediment flux, under changing temperature, preciptation, dams, land-use…..

HydroTrend Climate Scenario

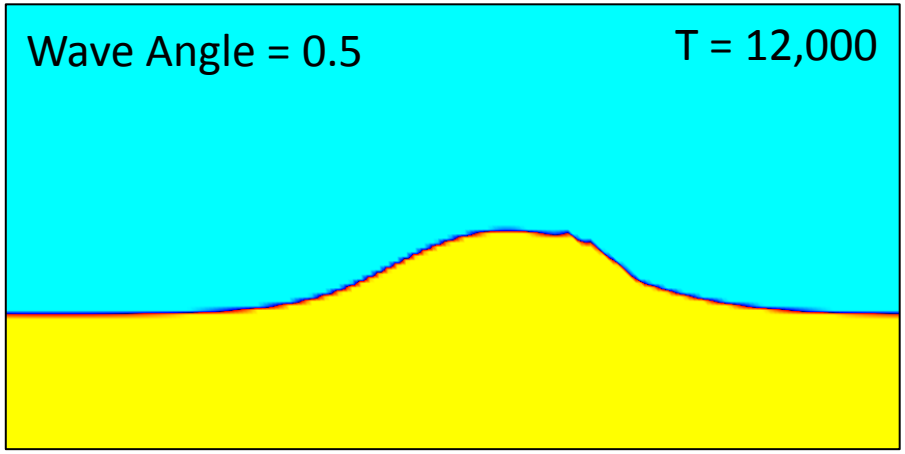


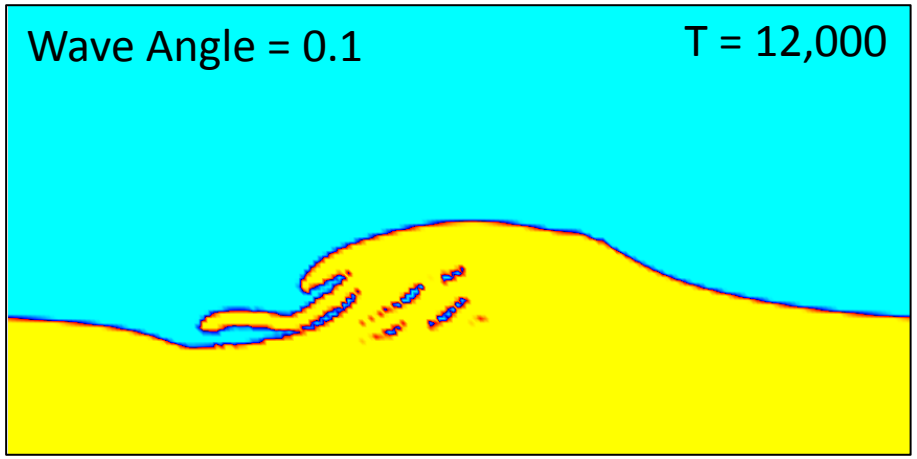
Plume Model in WMT

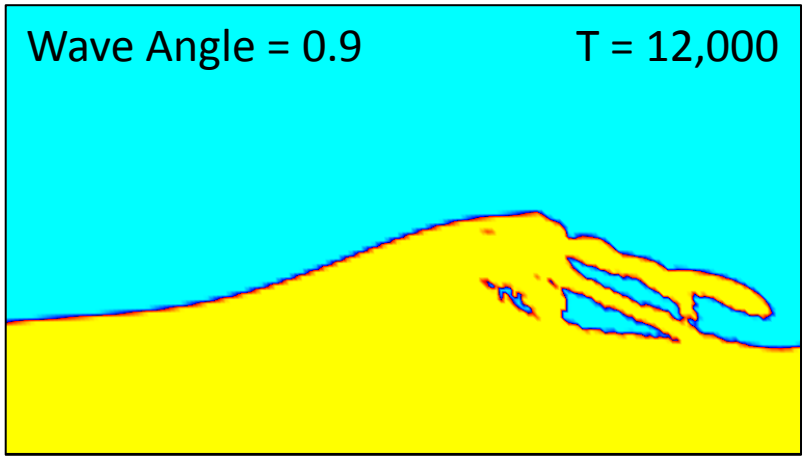


- Flood-Plume Deposits of the Rhone Delta, France, 90 days weather data.
- Compared with oceanography studies of Drexler, Nittrouer, Ogston et al., 2008.

Wave-dominated Delta Model in WMT

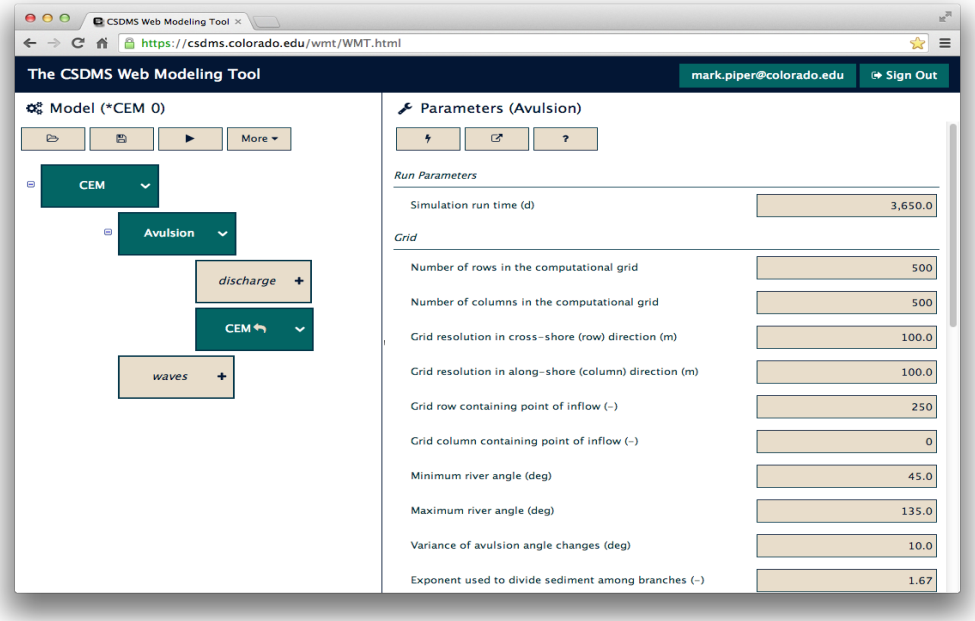


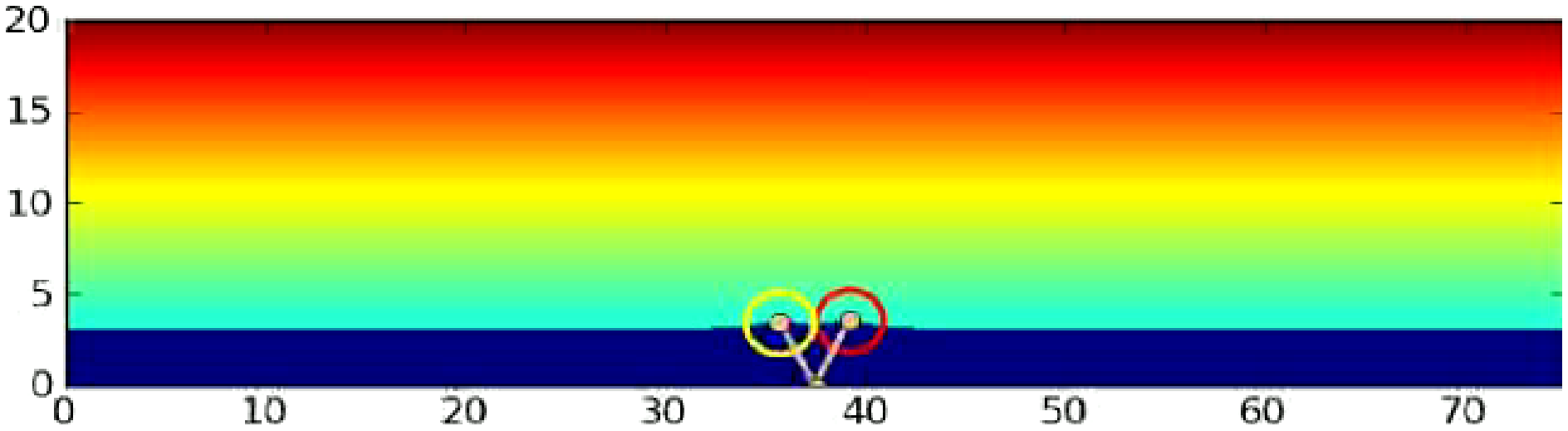




Simulation set 2 allows process-response relationships to be explored.

Learning Objective: Describe-Predict certain responses based on specific process parameters





Ashton et al., 2013, Computers & Geosciences 53: 21-29

What cyberinfrastructure is in-place?

- Open-source: Data & Models need to be made available to researchers and public worldwide
- Metadata: Data & Models need to be documented labeled with strict standard names to ensure inter-operability
- Cyberinfrastructure: Data and Models are shared in a user-friendly, flexible modeling infrastructure

Discussion

For audience discussion:

- Identify Data & Models that are critically needed to inform policy for a variety of users and disciplines
- How do data and models need to be integrated?
- Would models be used to look at implications of change (scenario modeling). What are the most pressing trends to be modeled in your particular delta?

Find out more!

- Technological base for web-sharing and interaction is now much more accessible to all users

- http://csdms.colorado.edu/wiki/Labs_WMT_River_Sediment_Supply

- http://csdms.colorado.edu/wiki/Labs_WMT_Ganges_Sediment_Supply