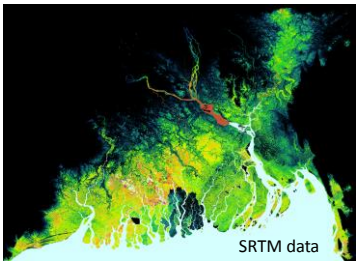
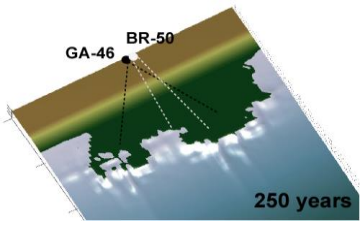
Challenges and Opportunities in Data Collection and Delta Modeling





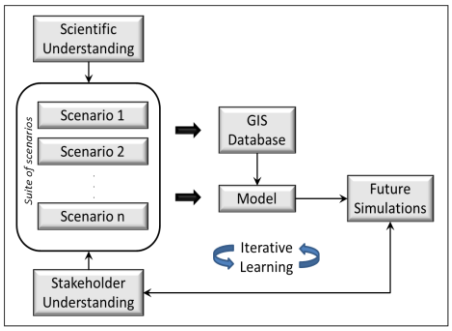
Irina Overeem[1], Zachary Tessler[2], Charles Vorosmarthy[2]

[1]CSDMS, University of Colorado at Boulder, USA

[2]CUNY Environmental CrossRoads Initiative, CUNY, 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

Data Challenges

Data is needed, but not collected, or cannot be collected…..

Data can be collected, but there is no baseline to look for change or trends……..

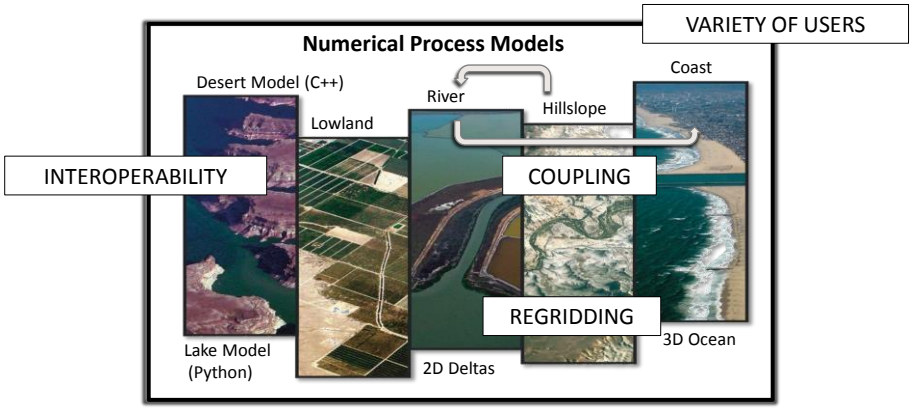
Data is not quality controlled or documented….

Deltas are a complex system, we need data from a large variety of disciplines: Bio-physical, ecological, socio-economical, policy data…….

Deltas are intimately connected to their river basins, need data far upstream……..

Data may be politically sensitive between different countries with different needs for resources…….

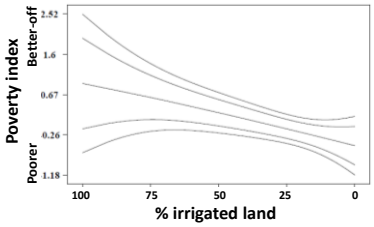
Modeling Challenges

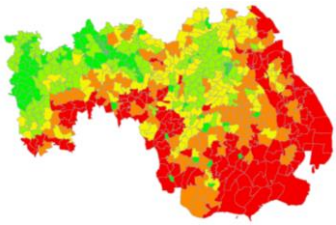


Technical or software challenges, but social and design decisions form a challenge as well (From: Overeem et al., 2012)

GIS Modeling

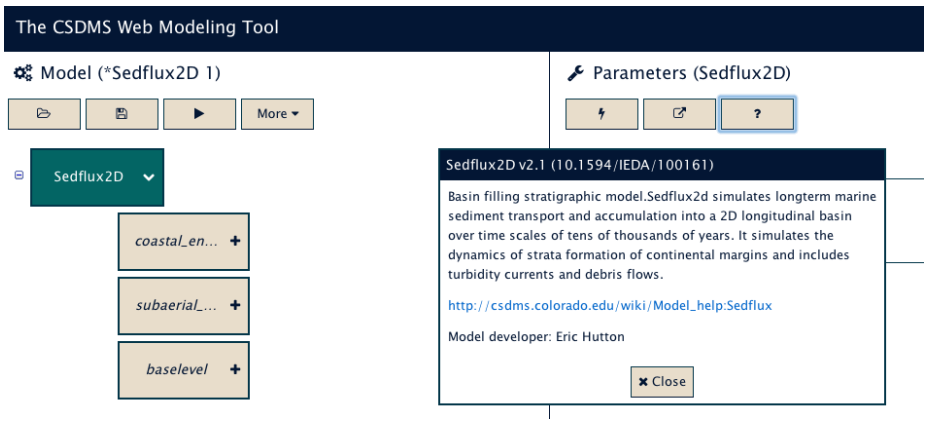
- Searching for **associative relationships** amongst:
  - land use/land cover,
  - environmental quality and
  - Poverty (based on Census data)
- considers spatial dependence and spatial heterogeneity
- uses a variety of techniques:
  - Spatial autocorrelation techniques
  - Multivariate logistic regression models
  - Bayesian Geoadditive Semiparametric (BGS) logistic regression model





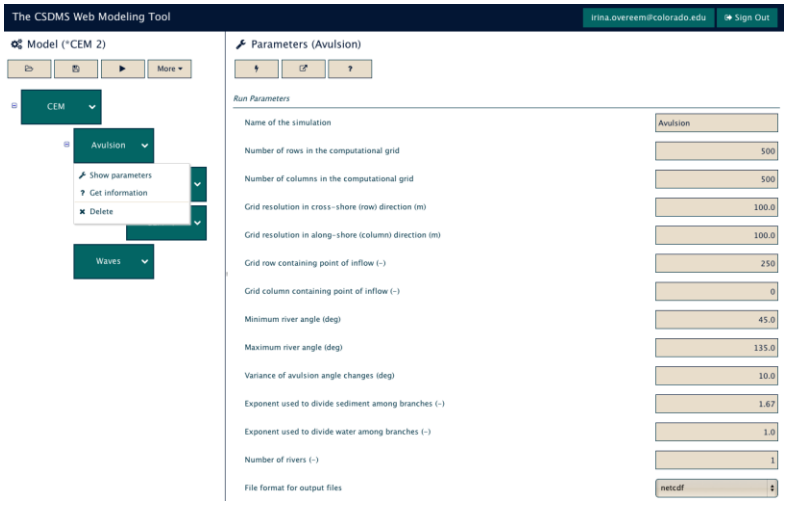
From: Lazar et al, 2014, CSDMS meeting presentation

BF-DELTAS modeling infrastructure

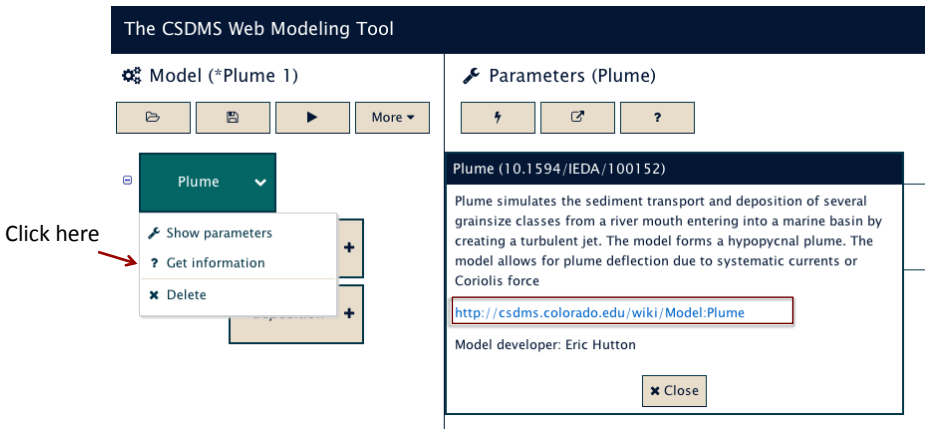


Data sharing through Irods, combined with CSDMS Web-based Modeling Tool
This example shows a stand-alone model.

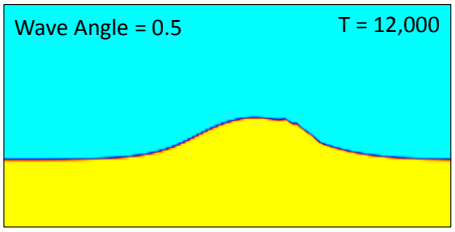
Data and Model Coupling

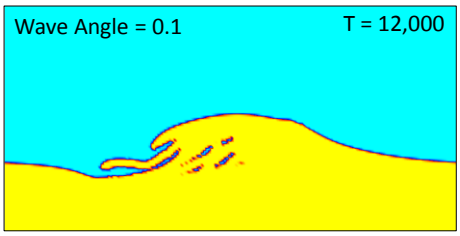


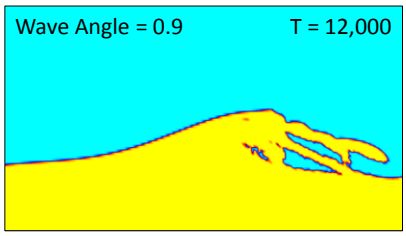
Integration between WMT and wiki



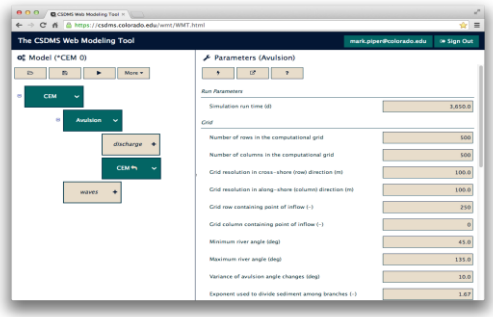
Example of Wave-dominated Delta Simulations

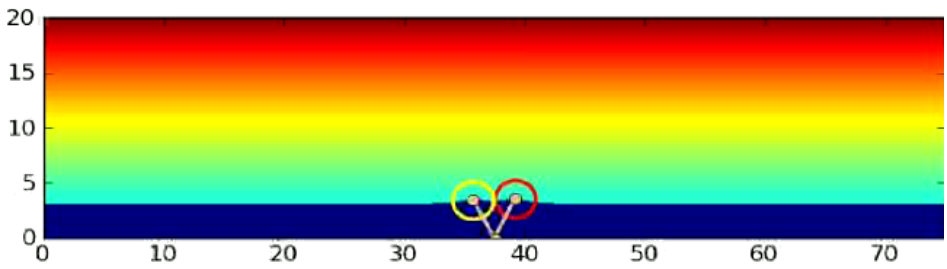






Simulation set 2 allows process-response relationships to be explored.
Learning Objective: Describe-Predict certain responses based on specific process parameters





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

Data & Model Opportunities

- Identify Data & Models that are critically needed to inform policy for a variety of users and disciplines
- 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 & Models need to be shared in a user-friendly, flexible modeling infrastructure

Opportunities for Education

- Model and data integration creates awareness of gaps in understanding
- 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