CSDMS

COMMUNITY SURFACE DYNAMICS MODELING SYSTEM

James P.M. Syvitski, Executive Director

CSDMS Integration Facility, Boulder CO

The National Center for Atmospheric Research NCAR managed by UCAR to serve the community

National Oceanographic Partnership Program Promoting Partnerships for the Future of Oceanography

CUAHSI universities allied for water research

neon NATIONAL ECOLOGICAL OBSERVATORY NETWORK

GEON PORTAL

MARGINS to understand the complex interplay of processes that govern the evolution of continental margins

NCED Earth Water Life

NSF

NASA

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

INL Idaho National Laboratory

USGS science for a changing world

ONR Office of Naval Research Revolutionary Research . . . Relevant Results

US Army Corps of Engineers

GLOBAL CHANGE IGBP International Geosphere-Biosphere Programme

IASC International Arctic Science Committee

International Council for Science Scientific Committee on Oceanic Research

LOICZ

GWSP Global Water System Project

IAHS AISH

Chevron

ExxonMobil

ConocoPhillips

bhpbilliton

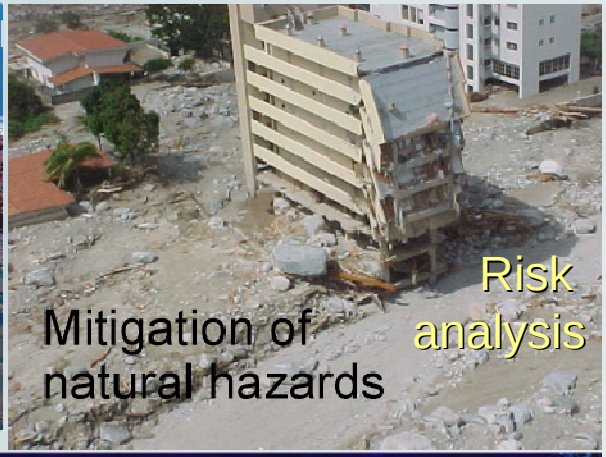
ifp Innovation Energie Environnement

WL | Delft Hydraulics part of Deltares Enabling Delta Life

ASR Limited

URS

HR Wallingford Working with water



CSDMS Goals:

Develop, integrate, disseminate & archive software that define the earth's surface dynamics by simulating the movement of fluids, and the flux of sediment and solutes (production, erosion, transport, & deposition), through landscapes, seascapes, and their sedimentary basins.

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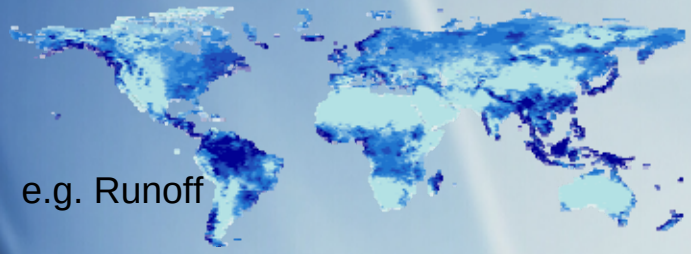
The CSDMS Data Repository

Climatology: T°C, PPT, Wind, Waves

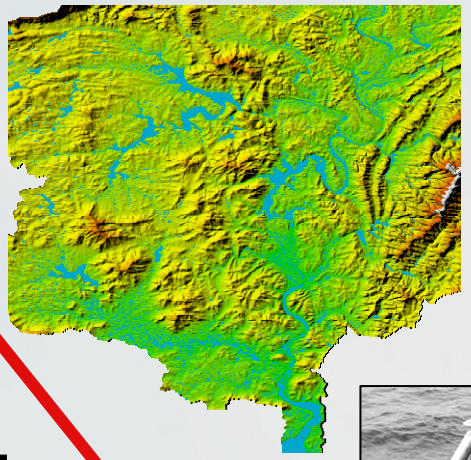


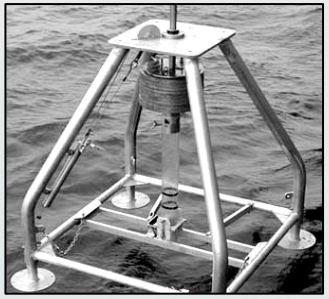
e.g. Runoff

e.g. Lithology

Gridded Boundary Conditions

Topography/Bathymetry/Sea Level



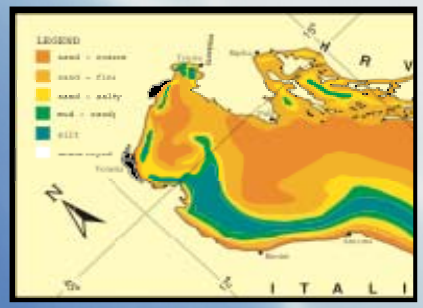


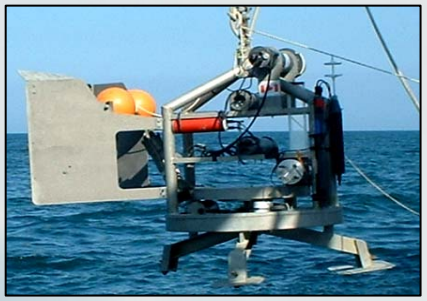
Data Integration in Modeling

$$Q_{s,s}^{x} = \int_{z=\delta wbl}^{h} c_s U dz$$

Gridded Initializations

Ice Sheet Cover
Soil Type/Thickness
Grain Size
Lakes/Reservoirs
Human Factors: GNP, Pop.
Vegetation
Lithology





Domain Parameterization

Flocculation
Critical Shear Stress
Bioturbation
Weathering grade
Productivity
Authigenesis

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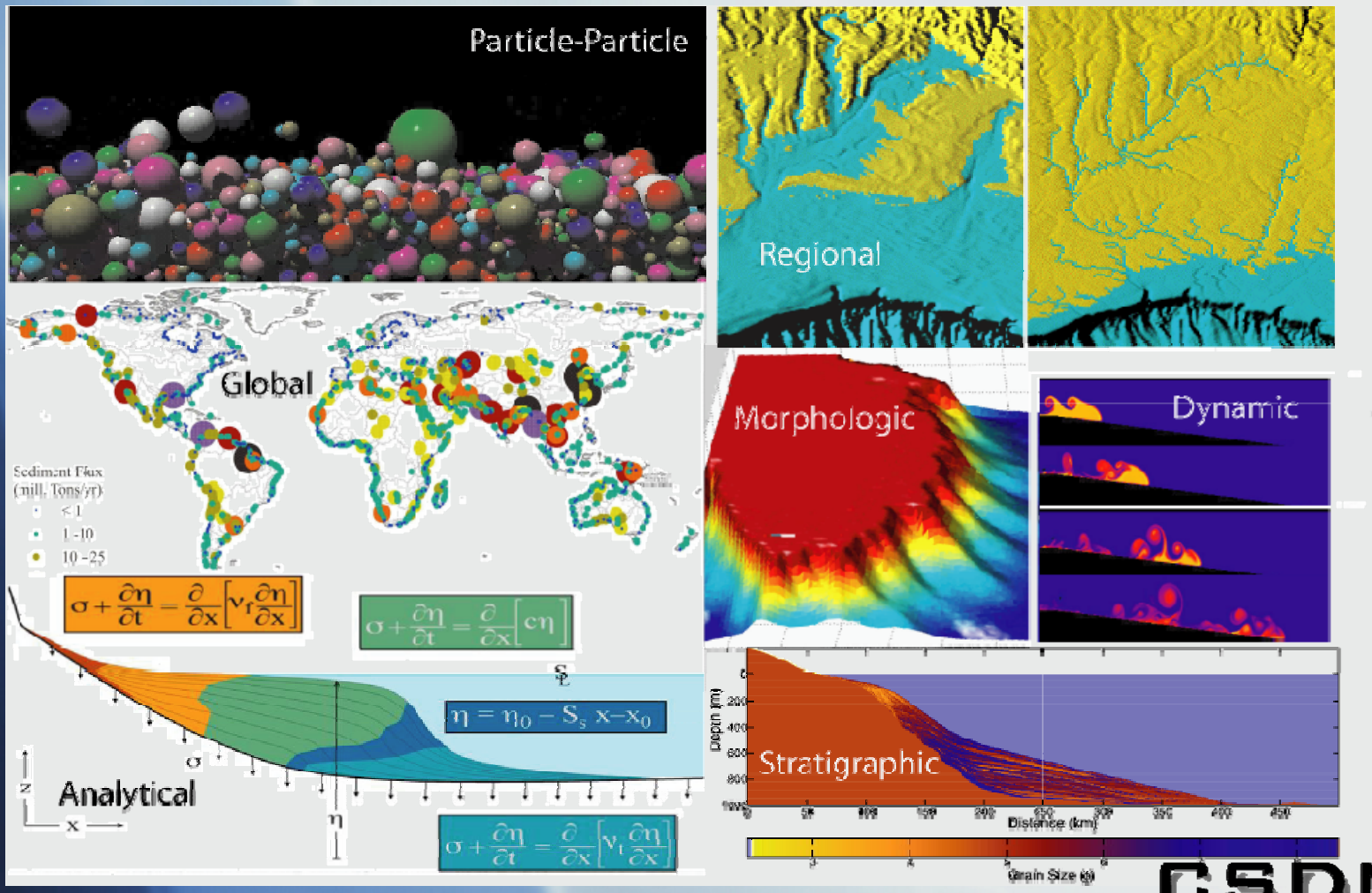
The CSDMS Model/Tools Repository

CSDMS welcomes stand-alone models/languages & tools relevant to surface dynamics, including novel computational strategies, moving boundary methods, distributed source terms, & nested modules



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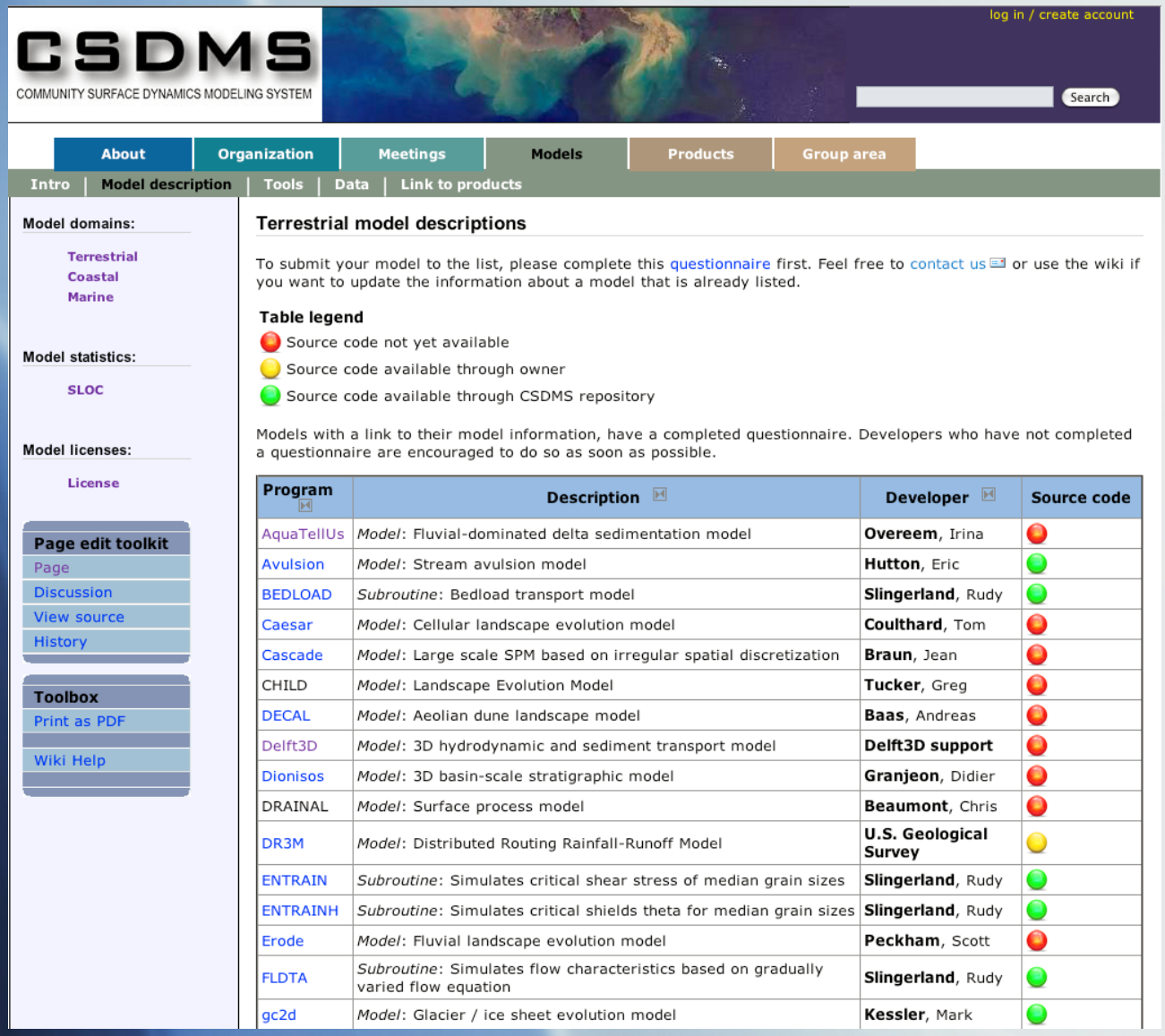
The CSDMS Model/Tools Repository

CSDMS points to, or distributes, >100 legacy models/code



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Terrestrial model descriptions

To submit your model to the list, please complete this questionnaire first. Feel free to contact us or use the wiki if you want to update the information about a model that is already listed.

Table legend

- Source code not yet available
- Source code available through owner
- Source code available through CSDMS repository

Models with a link to their model information, have a completed questionnaire. Developers who have not completed a questionnaire are encouraged to do so as soon as possible.

Program	Description	Developer	Source code
AquaTellUs	*Model*: Fluvial-dominated delta sedimentation model	**Overeem**, Irina	
Avulsion	*Model*: Stream avulsion model	**Hutton**, Eric	
BEDLOAD	*Subroutine*: Bedload transport model	**Slingerland**, Rudy	
Caesar	*Model*: Cellular landscape evolution model	**Coulthard**, Tom	
Cascade	*Model*: Large scale SPM based on irregular spatial discretization	**Braun**, Jean	
CHILD	*Model*: Landscape Evolution Model	**Tucker**, Greg	
DECAL	*Model*: Aeolian dune landscape model	**Baas**, Andreas	
Delft3D	*Model*: 3D hydrodynamic and sediment transport model	**Delft3D support**	
Dionisos	*Model*: 3D basin-scale stratigraphic model	**Granjeon**, Didier	
DRAINAL	*Model*: Surface process model	**Beaumont**, Chris	
DR3M	*Model*: Distributed Routing Rainfall-Runoff Model	**U.S. Geological Survey**	
ENTRAIN	*Subroutine*: Simulates critical shear stress of median grain sizes	**Slingerland**, Rudy	
ENTRAINH	*Subroutine*: Simulates critical shields theta for median grain sizes	**Slingerland**, Rudy	
Erode	*Model*: Fluvial landscape evolution model	**Peckham**, Scott	
FLDTA	*Subroutine*: Simulates flow characteristics based on gradually varied flow equation	**Slingerland**, Rudy	
gc2d	*Model*: Glacier / ice sheet evolution model	**Kessler**, Mark	

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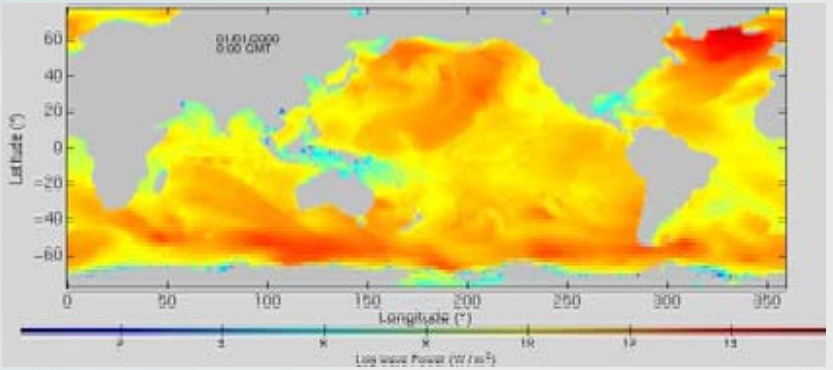
The CSDMS Education Repository

CSDMS distributes:

1) **Model Simulations,**
2) **Educational PPTs,**
3) **Reports, Publications,**
4) **Short Course Materials,**
5) **Images,**
6) **Workshop Presentations.**



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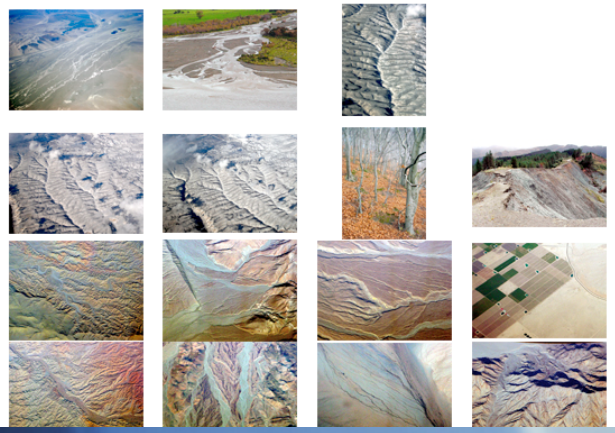
Galleries

- Terrestrial
- Coastal
- Marine
- Other

CSDMS Image Gallery

The images on this page illustrate aspects of environments that the CSDMS Project tries to capture by a suite of models. The freely downloadable images are generously contributed by various people. Please make sure to credit the contributors when you are using these images.
Email us your images if you are willing to share your best Surface Dynamics images.



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Upcoming Meetings | Past Meetings | General Info

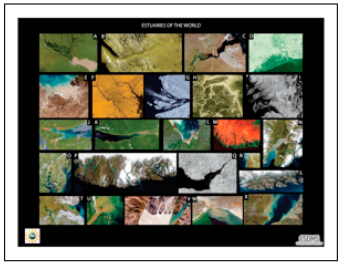
Mechanisms of Sediment Retention in Estuaries

Title: Mechanisms of Sediment Retention in Estuaries

Date: September 23 to 25, 2007

Location: Boulder, Colorado, USA

Agenda: Agenda as Pdf



Talks:

Presented by	Title	pdf
James Syvitski	CSDMS introduction	
James Syvitski	Geology, Geography, and Humans Battle for Dominance over the Delivery of Fluvial Sediment to the Coastal Ocean	
John Milliman	Introduction to group discussion	
Maria Snoussi	Discussion notes Sunday morning session	
Yoshi Saito	Morphodynamics and evolution of estuaries in response to climate and anthropogenic forcing	

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The CSDMS Compliant Repository

Compliant code is able to function within a CSDMS framework

Specs for the CSDMS Framework

Operating systems: *fedora, ubuntu*, *OSX10.5, and Solaris 8*

Parallel computation: *MPI*

Language interoperability: *Babel*

Model Architecture: *CCA*

Model Interface Standard: *OpenMI*

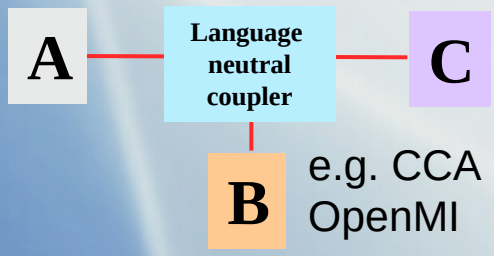
Software Distribution: *RPM*, *Debian*, *PackageMaker*, *Contractor*

Platform-independent GUI: *wxPython*

Version control: *Subversion*

Open source software license: *CSDMS architecture: MITX11*

Components: GPL2 compatible OSI approved.



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The CSDMS Team

Terrestrial

Tucker/CIRES
65 members
45 institutions
7 countries

Coastal

Murray/Duke
55 members
43 institutions
11 countries

Marine

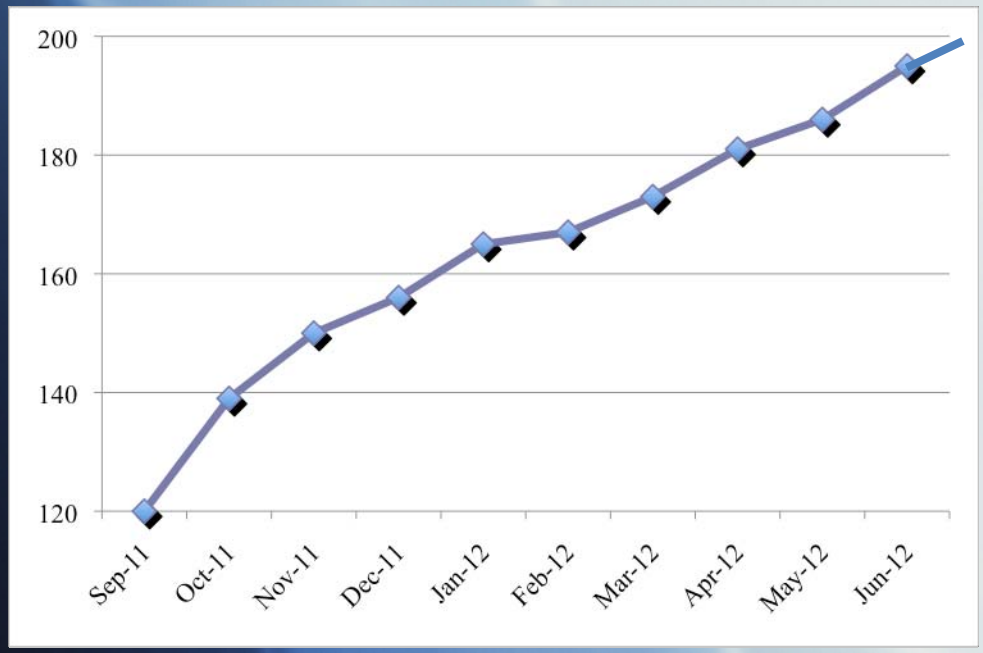
Wiberg/VIMS
47 members
40 institutions
8 countries

Cyber/Numerics

Tao Sun/ExxonMobil
30 members
20 institutions
3 countries

EKT

TBD
8 members
8 institutions
USA



Carbonate

Burgess/London
22 members
18 institutions
5 countries

Hydrology

Famiglietti/UCSB
?? members
?? institutions
?? countries

Chesapeake

Voinov/CCMP
?? members
?? institutions
USA

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CSDMS Proof of Concept Model Challenges

1. Tracking the production, transport & fate of water, sediments, carbon & nutrients.

2. Dynamic models that include the *Human Dimension*

3. Integration of models that track surface dynamics across moving boundaries (e.g. sea level, climate)

CSDMS Computational Resources:

The CSDMS Integration Facility offers its community a dedicated CSDMS High Performance Computing (HPC) with >500 cores, 72TB storage, @ 6 Tflops. The CSDMS HPC is to be linked to
1)A Front Range HPC, >7000 core, >100 teraflops,
2)The US TerraGrid,
3)A proposed NCAR/UCAR Petascale HPC dedicated to the Geosciences (100,000 core)

The Promise of CSDMS

Better understanding of the evolution of Earth's environments,

Better quantification of our knowledge uncertainties.

Contribute new numerical models to address the complexities, feedbacks & linkages in earth-surface science.

Proffer new numerical approaches for the benefit of society.

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