

# CSDMS

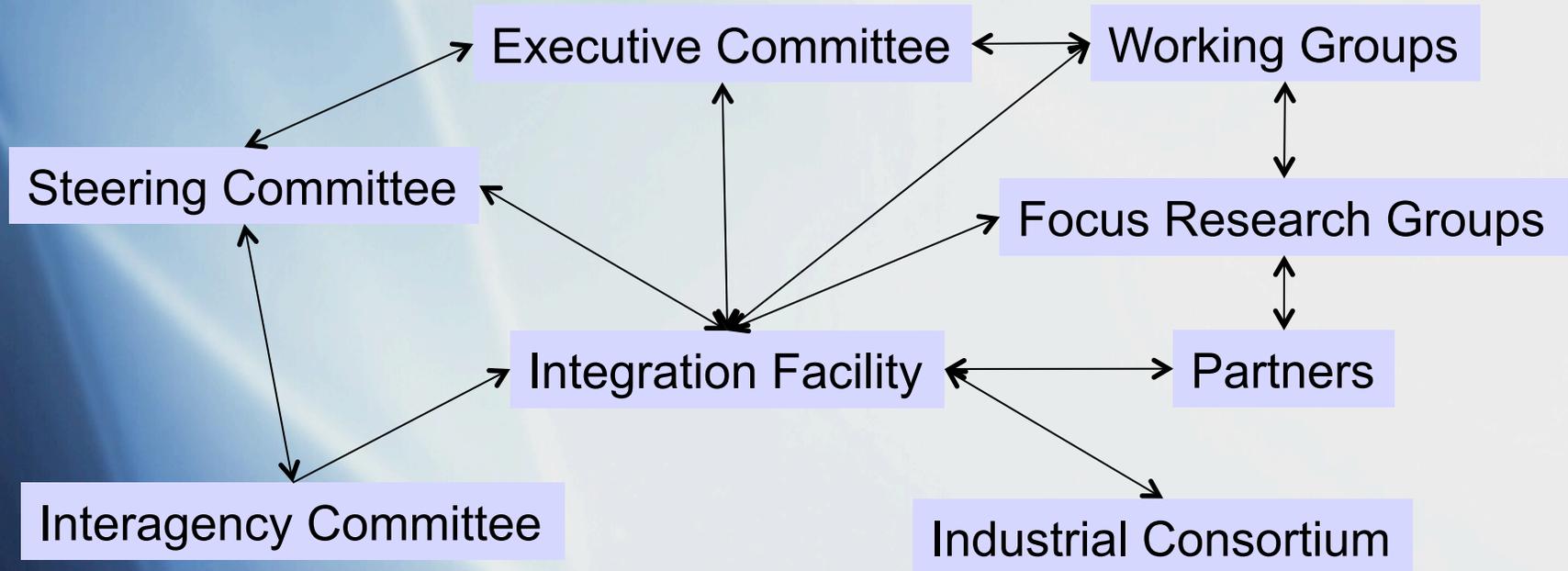
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM



- Cyber effort to develop, integrate, disseminate & archive software & supporting data, able to simulate the movement of fluids, sediment and solutes, through evolving landscapes, seascapes, and their sedimentary basins.
- Dynamical models configured to be linkable & tailored to specific landscape-basin evolution problems, at specific temporal and spatial scales.
- Partnerships with related computational programs, field campaigns and laboratory experiments.



# CSDMS Governance Structure

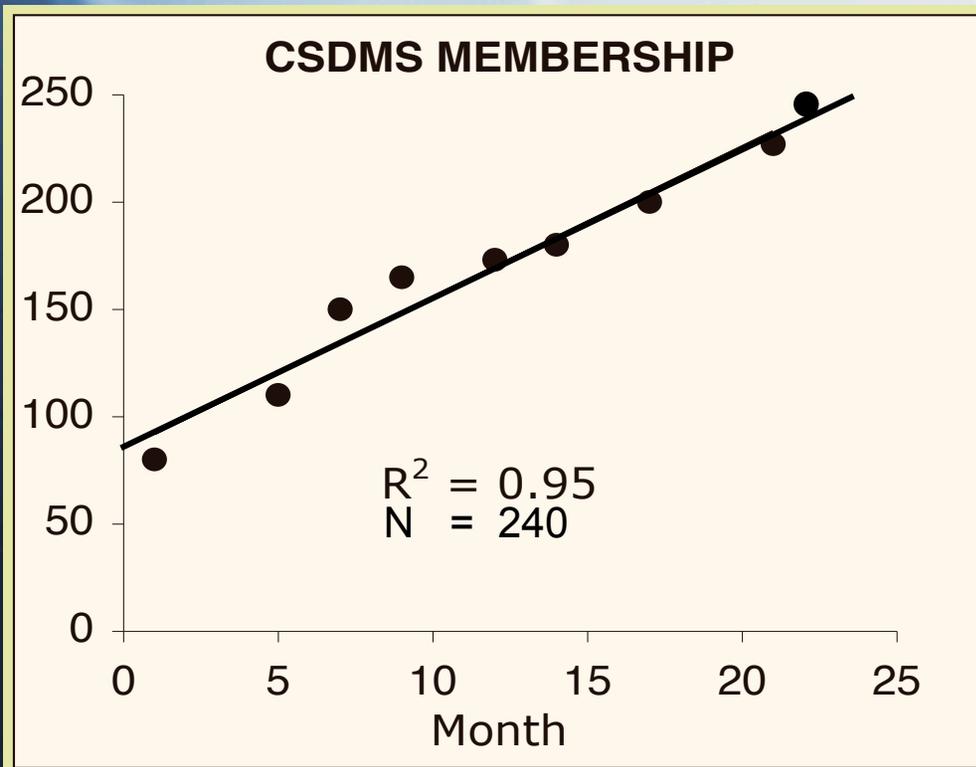


# CSDMS Working Groups & Focus Research Groups

Terrestrial	Coastal	Marine	Cyber/Numerics	EKT
<u>Tucker/CIRES</u>	<u>Murray/Duke</u>	<u>Wiberg/VIMS</u>	<u>Tao Sun/ExxonMobil</u>	<u>Campbell/NCED</u>
109 members	74 members	61 members	43 members	21 members
70 institutions	55 institutions	50 institutions	31 institutions	18 institutions
11 countries	13 countries	8 countries	6 countries	3 countries

Carbonate	Chesapeake
<u>Burgess/U. London</u>	<u>Voinov/CCMP</u>
15 members	8 members
10 institutions	5 institutions
3 countries	USA

Hydrology
<u>Famiglietti/UCIrvine</u>
33 members
25 institutions
5 countries



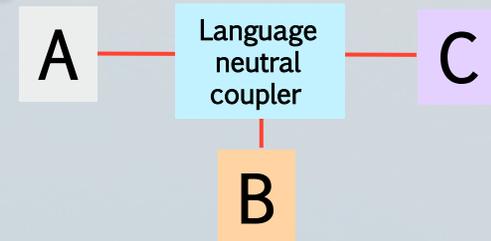
# CSDMS REPOSITORIES

## DATA Repository

- 1) model initializations or boundary conditions: total 26
- 2) benchmarking or testing standalone models: total 0
- 3) CSDMS framework validation experiments: total 0

## Model/Tool Repository

	Models+	Metadata	Source code
Terrestrial	78	55	42
Coastal	68	29	12
Marine	28	14	9

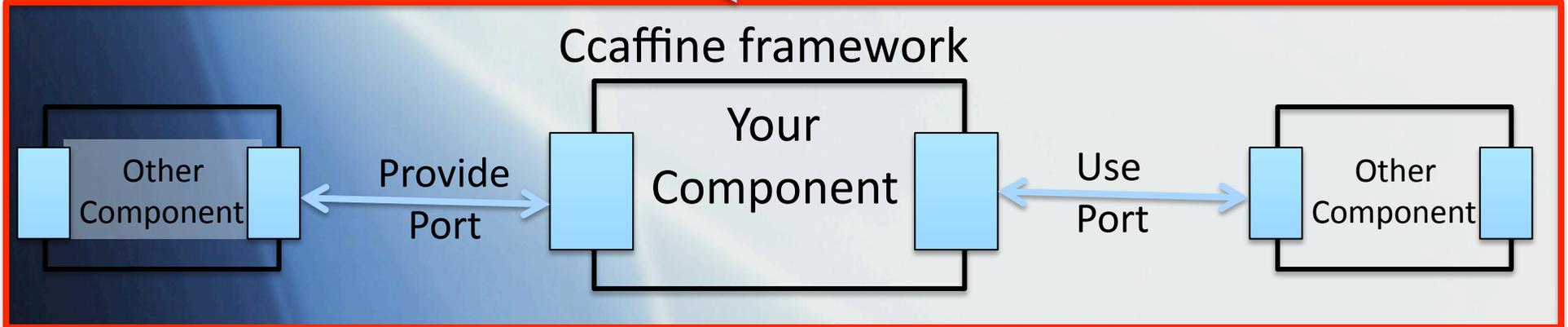
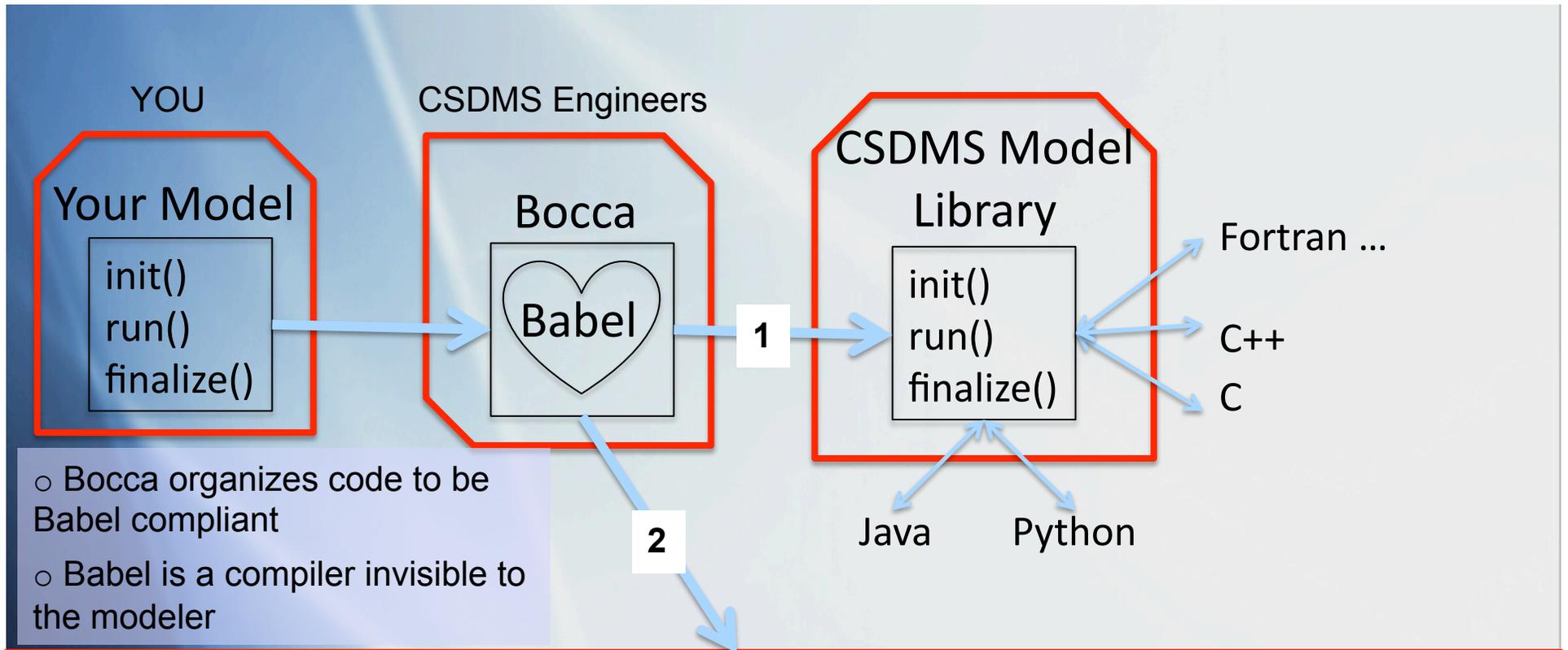


CSDMS presently offers >200,000 lines of code

## Education Repository

Model Simulations (1); Educational PPTs (15); Reports & docs (15); Image Gallery (140); Workshop PPTs (66)





Ccaffine framework allows CCA-compliant models to be coupled

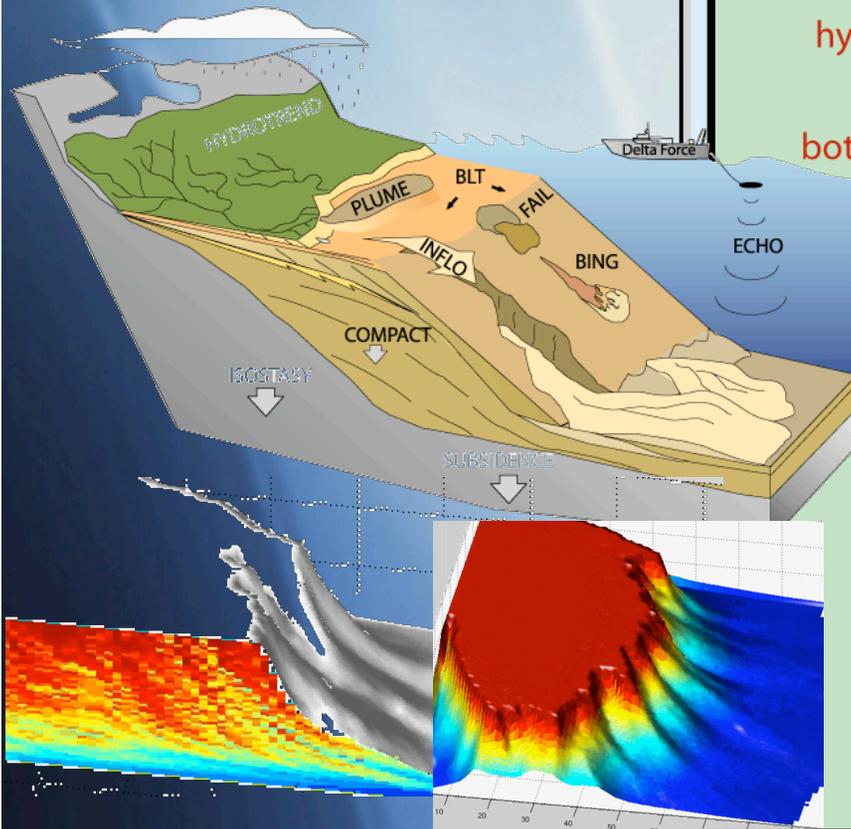


# SedFlux Component Modeling Scheme

**Hydrological Data or Model (e.g. HydroTrend)**  
daily Q, Qs, Q, Cs, grain size, river velocity, river channel size

**+ Ocean State:**

sea level, waves, tides, currents, sea temperature & salinity



**Delta Models:**  
distributary channel dynamics, channel hydraulics, bedload dynamics  
longshore transport, tidal dynamics

**River Plume Models:**  
hypopycnal plume dynamics, hyperpycnal plume dynamics

**Shelf Transport Models:**  
bottom boundary layer dynamics (wave, current interactions)  
fluid muds, upwelling, downwelling

erosion, deposition, seafloor properties, stratigraphy

**Geotechnical Models:**  
compaction, porosity, permeability,  
excess pore pressure, plasticity, sediment viscosity

**Slope Stability Models:**  
sediment strength, potential failure planes  
earthquake loading, sediment loading

Failure volume and properties

**Gravity Flow Models:**  
Turbidity Current dynamics, Debris flow dynamics  
erosion, deposition, seafloor properties, stratigraphy

**Geophysical Models:**  
tectonics (folding, faulting), isostasy, flexural response

**Acoustic Models:**  
sound scattering and attenuation



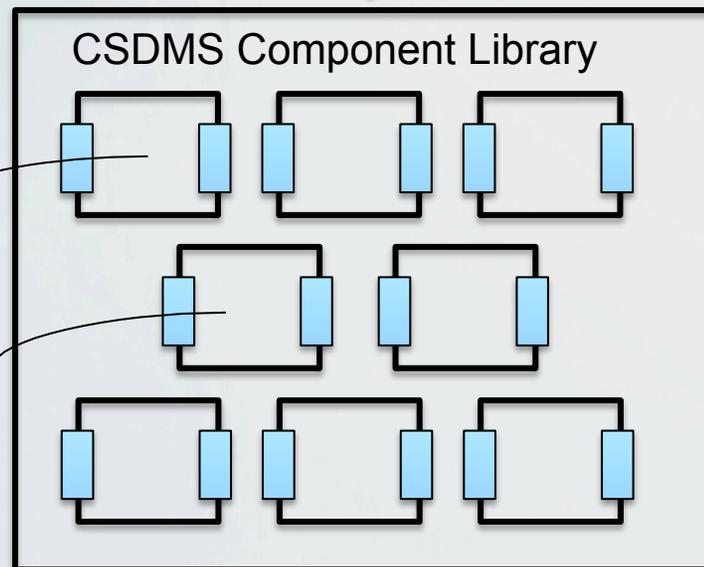
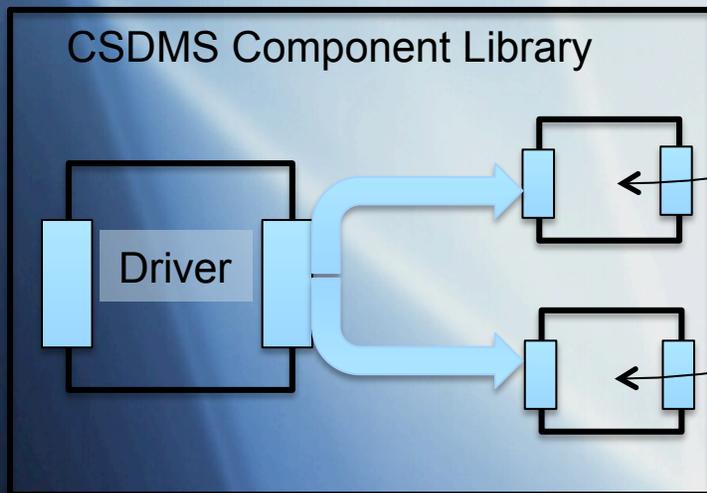
OpenMI  
SDK



BOCCA



CCA/CSDMS Services  
OpenMI Services



GUI or  
Command  
Line



## 2009 Meetings & Workshops & Conferences

1. Hydrology FRG meeting, Boulder, CO, Jan.20-21
2. Carbonate FRG meeting, Boulder, CO, Jan. 26-27
3. Terrestrial WG meeting, Boulder, CO, Feb. 2-3
4. CSDMS Steering Committee Meeting, Boulder, CO, Feb. 4
5. Coastal WG & Marine WG, Charlottesville, VA, Feb 25-26
6. CSDMS Executive Committee Meeting, Santa Barbara, CA, Mar. 2
7. Cyber-informatics & Numerics WG Meeting, Santa Barbara, Mar. 3-4
8. *Chesapeake FRG Meeting, Annapolis, Mar 22-25 ??*
9. **Modeling Turbidity Currents**, Santa Barbara, CA, June 1-3
10. **AAPG** (June 7-10, Denver)
11. **IAMG** (Aug 23-28; Stanford)
12. **River, Coastal, Estuarine Morphodynamics**, Santa Fe, Arg, Sep. 20-25



# Membership has its privileges

- Advantages in staying current for education and application
- Opportunities for integrated & collaborative proposals
- Recognized service opportunities; academic & public recognition for code development
- Penetration of one's models, data & simulation products; Increased outreach and knowledge-transfer opportunities
- Interaction with industry, NGO partners & government agencies
- Mechanism to fulfill Federal requirement that states that code developed on Federal \$ is to be both open-source & made public
- Access to the CSDMS-dedicated HPC Cluster (>6 Tflops) with links to Tier 3 (150 Tflops) & Petascale (Tier 2) high performance computers



Year 1 & 2: CSDMS organization, governance & communications established

Year 2 & 3: Model Architecture, Framework, and Interface Standards (i.e. for coupling) advanced

Year 3 – 5: Advanced simulations in a High Performance Computing environment



## Hydrology Focus Research Group Goals:

Define short, medium and long term goals within the CSDMS program

Identify & describe the OS-hydrological models, and their possibilities within CSDMS (PPT summary of findings, Paper)

Identify OS-hydrological model limitations; develop plans to rectify



# CSDMS Integration Staff



James Syvitski  
**Executive Director**



Scott Peckham  
**Senior Software Architect**  
WGs: Cyber, Hydrology, Chesapeake



Eric Hutton  
**Software Scientist**  
WGs: Cyber, Marine, Coastal



Irina Overeem  
**EKT Scientist**  
WGs: Industry, EKT



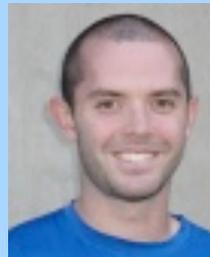
Albert Kettner  
**Cyber Scientist**  
WGs: Terrestrial, Carbonate



Baichuan Yan  
**Software Engineer**



Mark Hannon  
**Ph.D. Student**



Scott Bachmann  
**Ph.D. Student**



Yun-zhen (Jane) Chen  
**Visiting Ph.D. Student**



Mark Fentress  
**Accounting Tech**



Marlene Lofton  
**Executive Assistant**



Chad Stoffel  
**System Administrator**

