The **Community Surface Dynamics Modeling System**

develops, integrates, archives & disseminates software to define the earth's surface dynamics

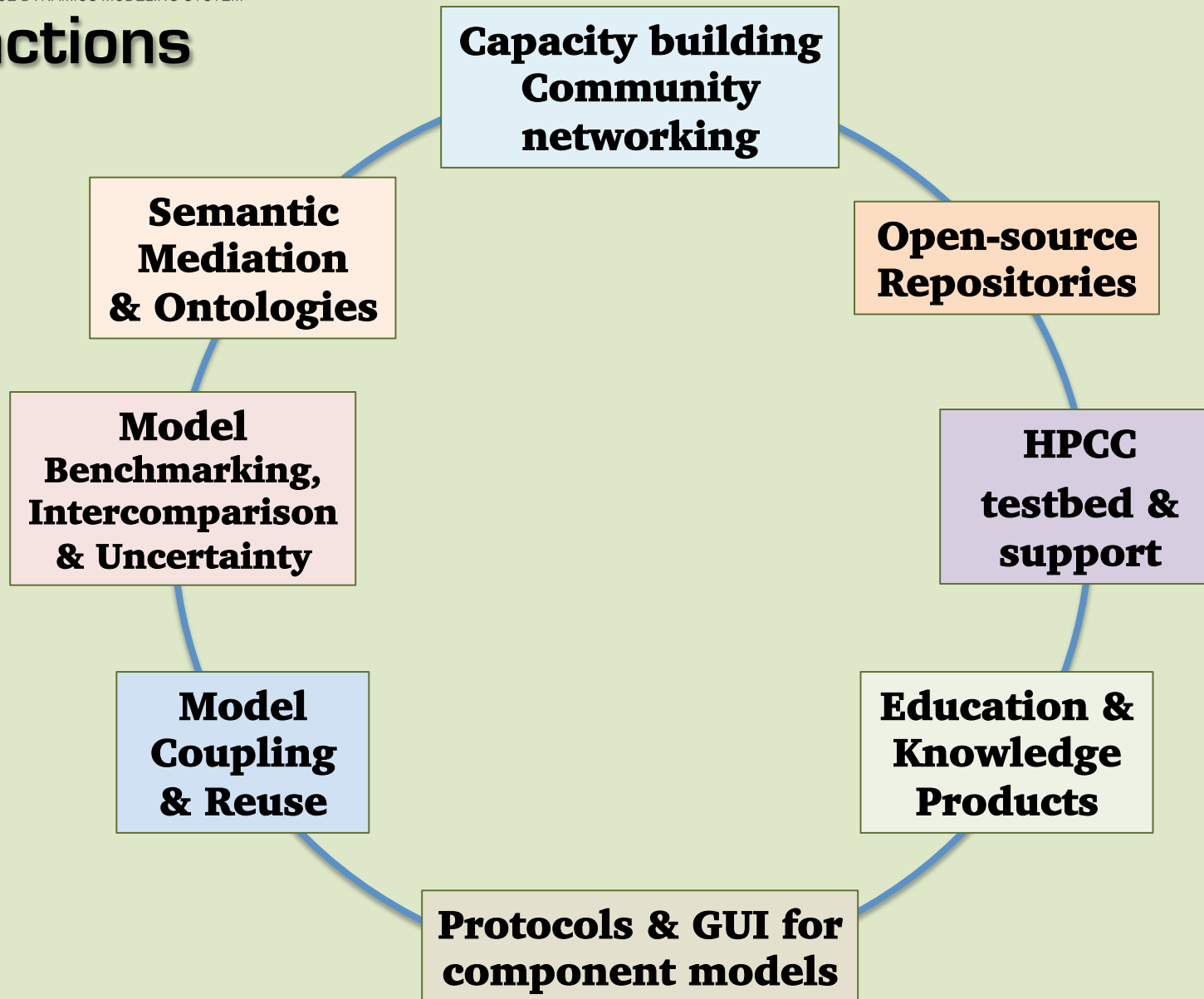**James Syvitski**, CSDMS Executive Director

CSDMS
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM

Functions

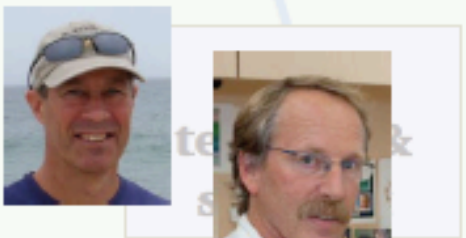Capacity building
Community
networking

* **150 new members**
* **New (ISEM) Ecosystem Dynamics FRG**
* **15 new instructional clinics**
* **EuroCSDMS to be at DELTARES**
* **New Chairs & Co-Chairs:**
  - **C. Sherwood- Interagency WG**
  - **R. Hood- Chesapeake FRG**
  - **Lejo Flores- Critical Z FRG**
  - **Mark Rounsevell- HD FRG**
  - **Brian Fath- Ecosystems FRG**

Syvitski, 2015

Capacity building, Community networking

Members from 500+ Institutions (academic, government, industry) from 68 countries

Working Groups

Terrestrial	610
Coastal	480
Marine	310
EKT	190
Cyber	185

Focus Research Groups

Hydrology	470
Carbonate	80
Geodynamics	80
Chesapeake	60
Critical Zone	50
Anthropocene	40
Ecodynamics	20

Initiatives

Coastal Vulnerability	40
Continental Margins	25

CSDMS
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM

Functions

OceanWaves

LANDLAB

Semantic Mediation & Ontologies

Capacity building Community networking

Model Benchmarking, Intercomparison & Uncertainty

Model ... use

PHREEQC
Hydrogeochemical Transport Modelling Course

Open-source Repositories

* 13 new terrestrial models & tools
* 5 new coastal models
* 7 new marine models
* 5 new hydrology models & tools
* 240 models & tools in total
* 15,000 downloads x2
* Downloads migrated to Github
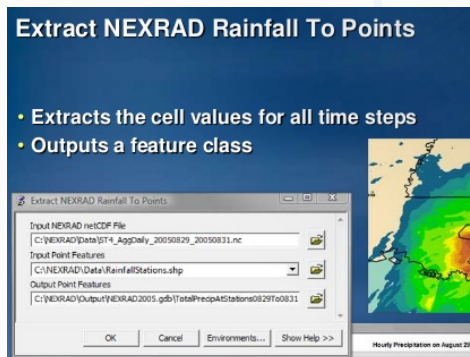
HPCC testbed & support

SLEPIAN delta

Education & Knowledge Products

Extract NEXRAD Rainfall To Points

- Extracts the cell values for all time steps
- Outputs a feature class

Extract NEXRAD Rainfall To Points

Input NEXRAD netCDF File
C:\NEXRAD\Data\ST4_AggDaily_20050829_20050831.nc

Input Point Features
C:\NEXRAD\Data\RainfallStations.shp

Output Point Features
C:\NEXRAD\Output\NEXRAD2005.gdb\TotalPrecipAtStations0829To0831

OK   Cancel   Environments...   Show Help >>

Hourly Precipitation on August 29, 1

csdms-contrib
Models & tools by CSDMS members
csdmssupport@colorado.edu

Protocols & GUI for component models

WETLAND3P

Syvitski, 2015

CSDMS Functions

Capacity building Community networking

- *Beach* our 8TFlop/s cluster is relocated to CU's Research Park
- Average CPU usage by CSDMS members ~50% last year
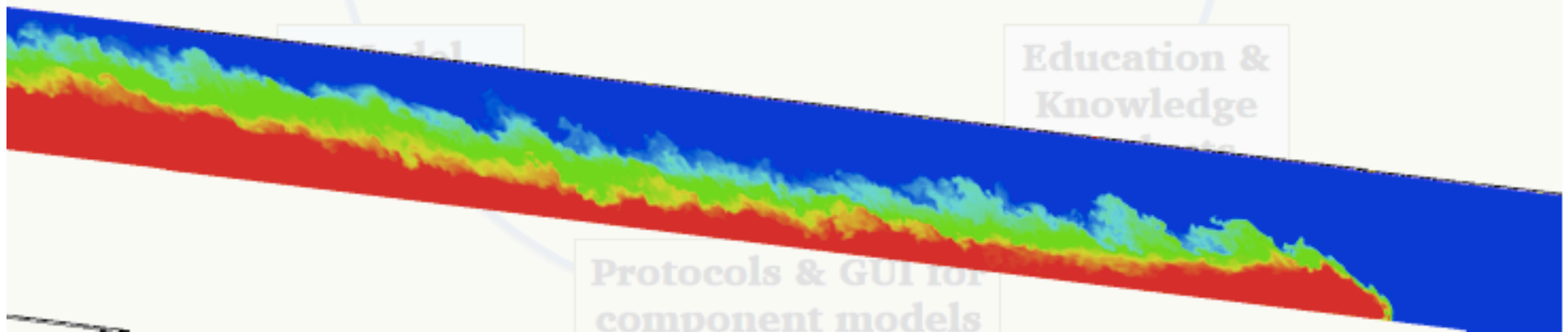- *Janus* CU's 150TFlop/s cluster remains available for CSDMS members use

HPCC testbed & support

Education & Knowledge

Protocols & GUI for component models

Syvitski, 2015

CSDMS
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM

Functions

Capacity building
Community networking

Semantic Mediation & Ontologies
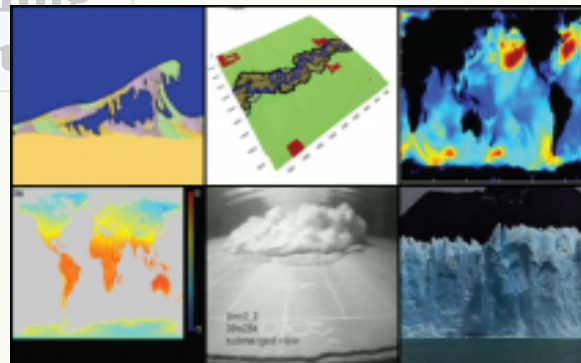
HPCC testbed & support

- ✧ **Student labs (16)**
- ✧ **Modeling short courses (8)**
- ✧ **Lectures (300)**
- ✧ **Textbooks (5)**
- ✧ **Global domain datasets (73)**
- ✧ **Special Issue on model uncertainty in review at C&G (No. 4)**
- ✧ **Instructional Clinics & Short Courses (72)**
- ✧ **Science on a Sphere (8 datasets and labs)**
- ✧ **Over 25,000,000 web page views**

ELSEVIER

COMPUTERS & GEOSCIENCES
AN INTERNATIONAL JOURNAL

Special Issue
Modeling for Environmental Change
Guest Editors
Albert J. Kettner and James Syvitski

Science On a Sphere®
National Oceanic and Atmospheric Administration

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Education & Knowledge Products

Syvitski, 2015

CSDMS
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM

Functions

Capacity building community learning

✧ Simplified the use of CSDMS's *WMT*

✧ *BMI* Builder in the testing phase

✧ *BMI* Importer for the CSDMS framework

Open-source Repositories

✧ Software Stack Installer for Mac OS & Linux
 e.g. *Yellowstone* & *Janus*
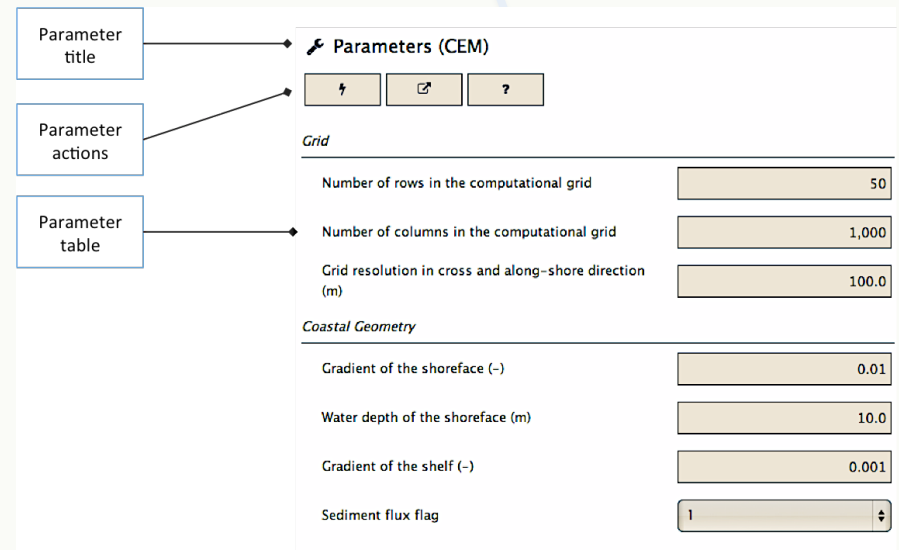
Intercomparison & Uncertainty

Model Coupling & Reuse

Protocols & GUI for component models

CSDMS
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM
Functions

Capacity building
Community
networking

**Semantic
Mediation
& Ontologies**

Open-source
Repositories

**Model
Benchmarking,
Intercomparison
& Uncertainty**

✧ 2600 CSDMS *Standard Names* (V. 0.8.1) with refined rules

✧ Prototype interface for running **DAKOTA** in WMT

✧ Python wrappers for **DAKOTA**

✧ **DAKOTA** application completed: parameter studies and uncertainty quantification (e.g. Delft3D & HydroTrend)

A Multilevel Parallel Object-Oriented Framework for:

DAKOTA

- Design Optimization
- Parameter Estimation
- Uncertainty Quantification
- Sensitivity Analysis

2015 Annual Meeting Agenda

Tuesday	Wednesday	Thursday	Friday
Welcome talks (3)	Keynotes (4)	Keynotes (2)	ExCom Meeting
Keynotes (2)	Group Business Meetings (5)	Clinics (3)	SC Meeting
Discussions (5) *What do modelers want from the data community?*	Lunch	Lunch	Lunch
Lunch	Clinics (3)	Keynotes (3)	
Clinics (4)		Group Business Meetings (5)	
Keynotes (2)	Posters	Reports & Wrap-Up (2)	
Posters	Banquet	Departures	

CSDMS
COMMUNITY SURFACE DYNAMICS MODELING SYSTEM

2015 Annual Meeting Theme:
Data meet Models, Models meet Data

1) *Surface Dynamics Modeling* — posters & presentations

2) **Modeling Clinics:** *WMT & Dakota, Hydro Data, OpenFOAM, CHILD, CEM, BMI, Integrated Modeling, CSDMS EKT, Landlab, CUHASI WDC*

3) **Group Discussion:** *What do modelers want from the data community?*

4) **CSDMS Group Business Meetings:** Goals and Activities
    i) increasing the number of BMI components,
    ii) advancing medium term and long term goals.

5) **Fostering of a Community**— Honors, Awards, and fun!

2015 CSDMS Program Director's Award

Dr. Bilal Haq, former Director for Marine Geosciences, NSF

- Ph.D. (Pakistan) and D.Sc. (U Stockholm)
- Employment, U Vienna, U Stockholm, WHOI/MIT, Exxon, U Paris, White House, World Bank
- Authored or co-authored 150 papers and books —several are *citation classics,* the *most cited in geosciences*
- Francis Shepard Medal (SEPM), NSF's Antarctic Medal
- GSA Fellow; AAAS Fellow
- AGU's Ocean Science Award, Killam Chair
- Honorary D.Sc. from the Sorbonne
- A fossil *Genus* and a fossil *species* named after him

Merit — *For Bilal's sustained push to get the sedimentology and stratigraphy community to become more quantitative, better integrated and organized, and to collectively speak with a clearer voice in addressing the needs of the nation. This includes early recognition and support of CSDMS in addressing these needs.*

2015 CSDMS Life-time achievement Award

Prof Chris Paola, NCED Co-Director
- B.Sc. Lehigh U, M.Sc. U Reading, D.Sc. MIT/WHOI
- Geological Society of London's Charles Lyell medal in 2011
- SEPM's Laurence L. Sloss Award in 2014
- Awards for outstanding advising, instructing,
- Authored or co-authored 150 papers and books — *several outstanding journal papers*
- GSA Fellow, AGU Fellow

Citation — As a pioneer and world leader on the subject of quantitative dynamic stratigraphy, and for studies on basin filling and controls on physical stratigraphy, braided streams, particle fractionation in depositional systems, bedform dynamics and self-organization in landscape evolution.