### NSF Workshop: Community Sedimentary Model for Carbonate Systems



#### Hosted by:

**CSDMS** 

February 27-29, 2008 CSM, Golden, CO Community Surface Dynamics Modeling System Dr. James Syvitski, Director

Co-conveners: Rick Sarg, CERI, Colorado School of Mines Gene Rankey, Univ. of Miami Evan Franseen, Univ. of Kansas & KGS





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# **Carbonate Community Model System**



CARB3D



## Integration and A Shared Community of Carbonate Models

• Model development plus field data with mutual feedback to both.

- Models will be the *storehouse of new knowledge*, translated to numerical schemes. An emphasis on collaboration between climatologists, sedimentologists, stratigraphers, geobiochemists, and biologists.
- *Climate* information should predict potential carbonate biotic responses and lead to stochastic models of platform sedimentation. A planned partnership with NCAR.
- Integration across scales and environments will require *partnerships between modelers and field workers.*
- Integration will require *forward models and inverse one- and two-dimensional-models* of corbonate platform sequences

## Framework for Carbonate Community Sediment Model

- Types of Investigation: (1) *Fundamental Research* Next Generation of Facies & Platform Concepts; (2)
  Develop Minimum of Two Levels of *Numerical Models* – Long- term, Time Averaged, & Short-term Event Level Scale.
- Focus on *Main Processes* (e.g., biologic & chemical sediment production, affects of waves & currents).
- Stress Integration of Processes, Environments, Basin Architecture, Climate, & Sea Level.
- **Diagenesis** Included Reactive Transport Modeling.
- Not One Model, but a Suite of Inter-Connectable Process Modules with Common Architecture for Defining Model Domain and Boundary & Initial Conditions.



#### **Reactive Transport Models**

(A) 0.2 m.y.

100 m

100 m

100 m

500 m

500 m

(C) 0.2 m.y.

500 m

(B) 0.2 m.y.

0



Jones & Xiao, 2005

### **Workshop Breakout Groups**

#### **Objectives for each Breakout Group:**

- 1) Current Level of Knowledge Qualitatively & Quantitatively.
- 2) What are Our Grand Challenges for the Future?
- 3) What are Our Knowledge Gaps? What Experiments are Necessary to Close those Gaps?
- 4) What Kinds of Data do We Need, and Who are the Necessary Partners?
- 5) Concise White Paper Summary.

#### **Breakout Topics:**

- Physical Controls on Carbonate Deposition Morgan & Demicco
- Biologic Controls on Carbonate Deposition Webster & Hallock-Muller
- •Tools/Approaches for Quantifying Controls, & Increasing Resolution of Systems & Time Scales – Hinnov & Droxler
- Modeling Strategies Hannisdal & Griffiths
- Modeling Diagenesis Budd & Jones