



Carbonate Modeling: who, what, why & where to?

Christopher G. St. C. Kendall University of South Carolina

Web site:http://strata.geol.sc.edu/modeling-ref.html

E-mail: kendall@sc.edu

Who are some of the carbonate modelers?

- Aigner Deterministic 2D
- Bosence, Waltham & Warrlich 3D Forward & Fieldwork
- Bosscher 2D Forward Model
- Bowman Forward Model
- Cowell Shoreface Model
- Cross and Duan 3D Forward Model
- Demicco Fuzzy Modeling

Who are some of the carbonate modelers?

- Flemmings Meter-scale shallowing cycles
- Goldhammer High-frequency platform carbonate cycles
- Granjeon Diffusion-based stratigraphic model
- Kendall Deterministic forward model
- Ulf Nordlund Fuzzy logic
- Read Two-dimensional modeling
- Rivanaes Depth-dependent diffusion models of erosion, transport & sedimentation



- Depth Light penetration
- Temperature Tropical & temperate
- 🗢 Oxygen
- Salinity phosphate
- Cementation & Organisms
- Erosion Cyanobacteria & bacteria
- Nutrients particularly
- Abrasion



- Building better hydrocarbon reservoir models
- Building better acquifer models
- Building better stratigraphic models
- Making movies to show
 - Relationship of carbonates to changes in sea level.
 - Ramp to rim
 - Platform to basin
 - Slides and turbidites

Data for carbonate simulations limited!

The United Arab Emirates in the Southern Arabian Gulf an ideal source!

Complete suite of shallow water carbonates

- Organic matter, biostratigraphy, geology, oceanography, hydrology, and atmosphere
- Tectonically well defined
- Section similar from Triassic



Future directions!

Interplay of high frequency sequence stratigraphy with 2nd and 3rd order sequences

- 3D Process Modeling
- 3D Empirical Modeling
- Bedding planes and boundary conditions
- Recognition of missing time!



Conclusions

- Carbonate models are a mix of deterministic and process driven
- Input variables are know but their value has to inferred from the geologic record
- Carbonate models are going 3D
- Subsurface models commonly oil field based
- Movies are worth a thousand words

Need work with a setting like the Arabian Gulf