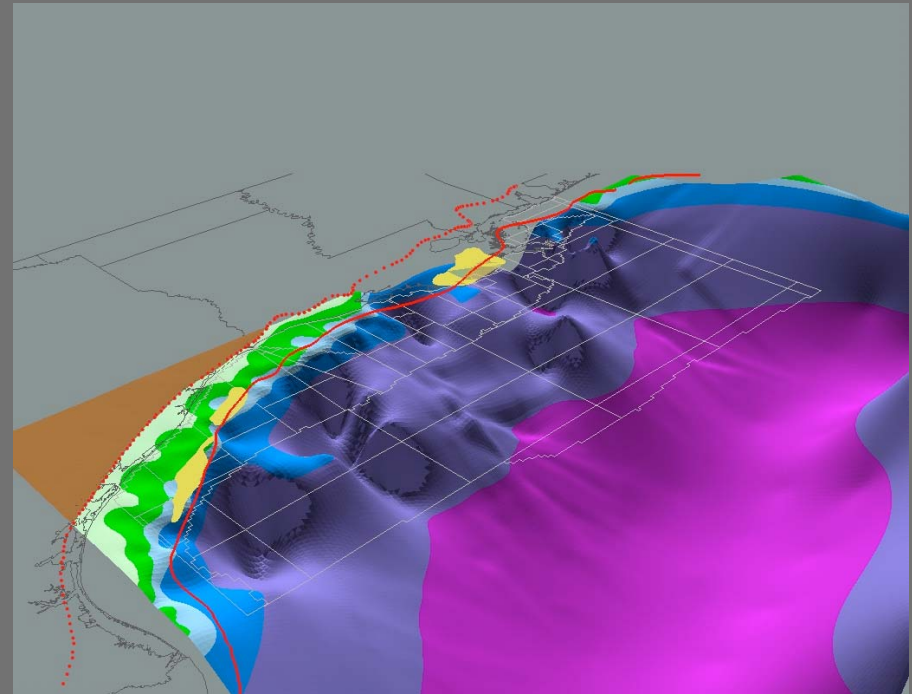


# GBDS Paleobathymetry

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and  
William E. Galloway*

*University of Texas Institute for Geophysics*

- Grid construction
- 2D paleobathymetric surfaces
- 3D paleobathymetric surface
- Derivative data (“doppler” maps)



MM-H

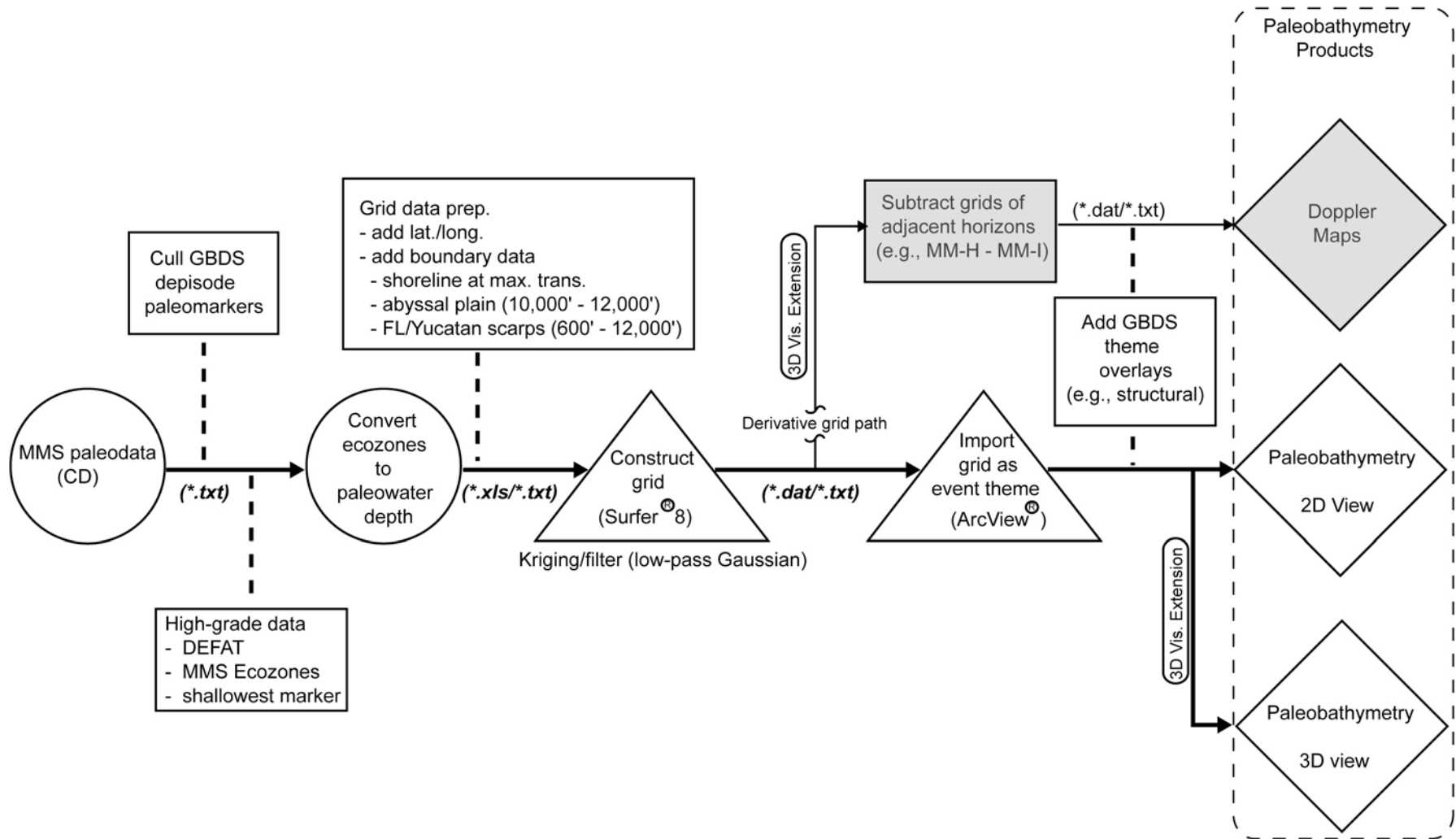
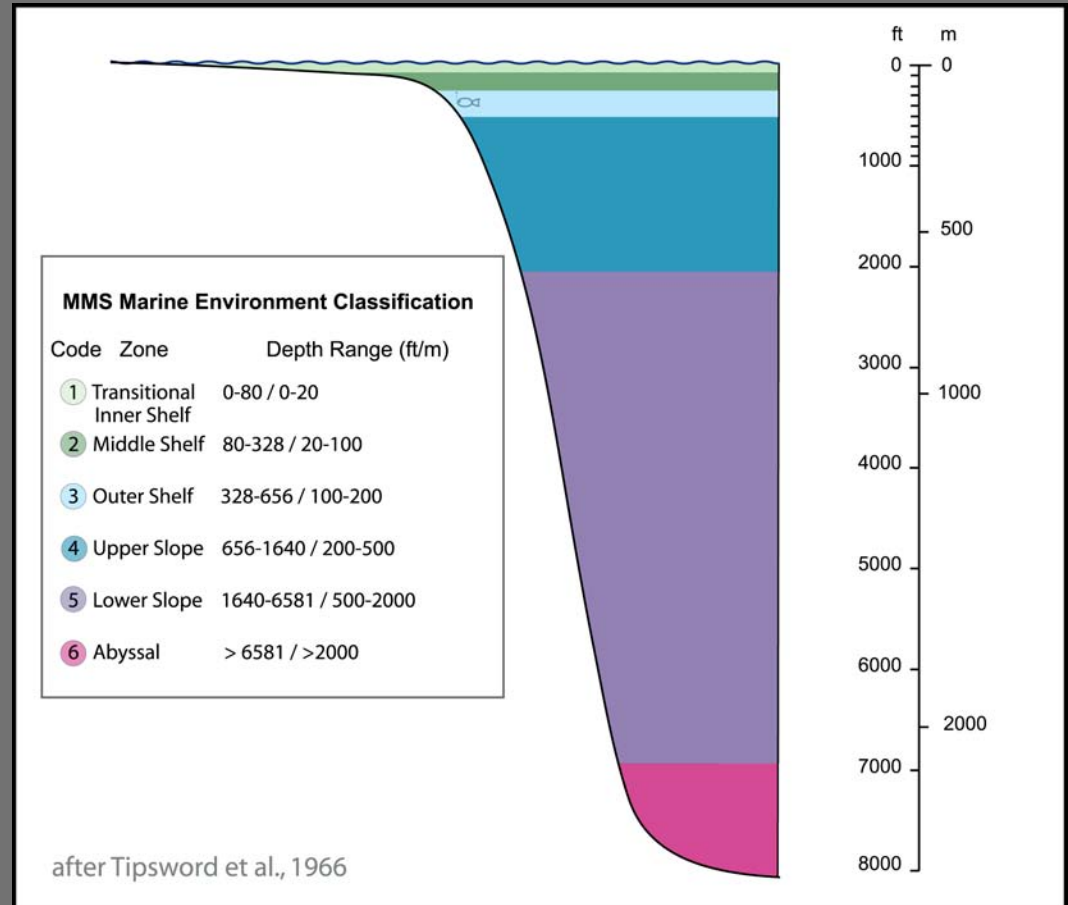


Figure 1. Simplified process flow chart for paleobathymetric grid construction. Files included in GBDS paleobathymetry project shown italicized. 3D views are only included in GBDS update as image files. Doppler map generation flowchart branch shown in grey. Doppler grids and maps are not part of the GBDS project update. The ArcView® 3D Analyst extension must be enabled to view paleobathymetry in three-dimensions. The ArcView® Spatial Analyst extension also can be used for grid algebra, i.e., doppler map generation.

# MMS Paleodata

- GBDS depisode markers
- MMS data high-graded
  - DEFAT
  - MMS Ecozone

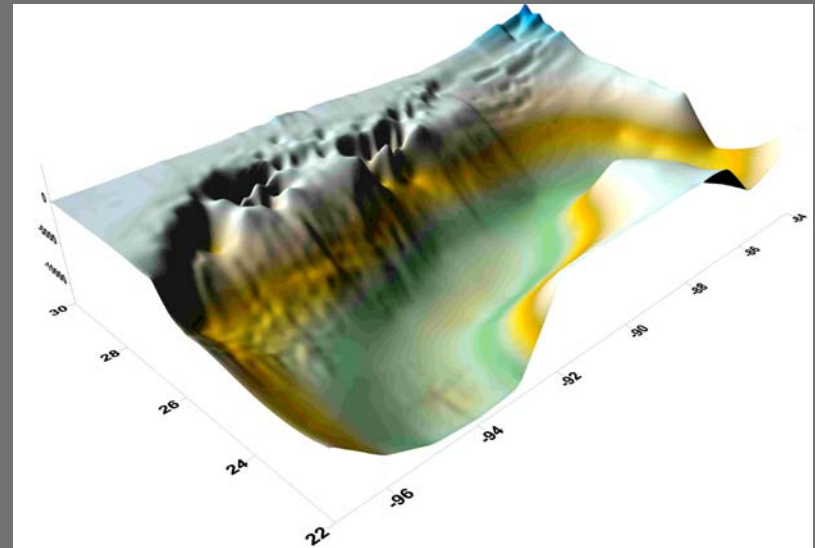


# Grid Data

- MMS data (high-graded)
  - ~700 datapoints per surface (average)
  - Pliocene best constrained (~1200 per surface average)
- Paleoshoreline
  - Shoreline at maximum transgression (SMT)
- Paleoshelf margin
  - Maximum progradation
- “Dummy” data points (e.g., abyssal plain, Florida scarp)
  - Extrapolate grid into areas lacking well control

# Gridding -- Surfer8

- Kriging (expresses trends)
  - Point (honors data @ node)
  - Ordinary (no drift)
  - Grid
    - 22-30N and 84-97W
    - 3.5 mi. - square cell
- Grid filter
  - Low-pass Gaussian
    - Smoothing filter
  - Remove high freq. var.



PB1

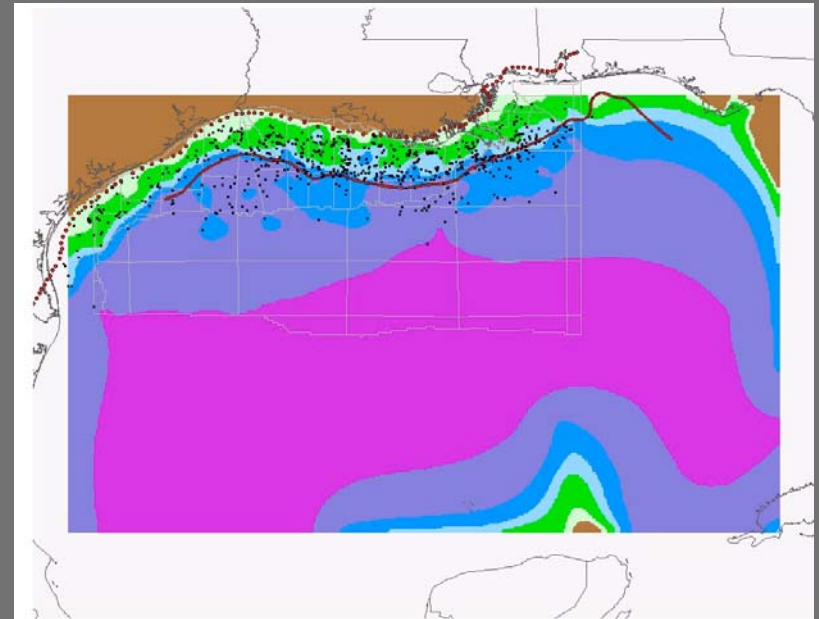
# 2D Paleobathymetry

## GBDS data

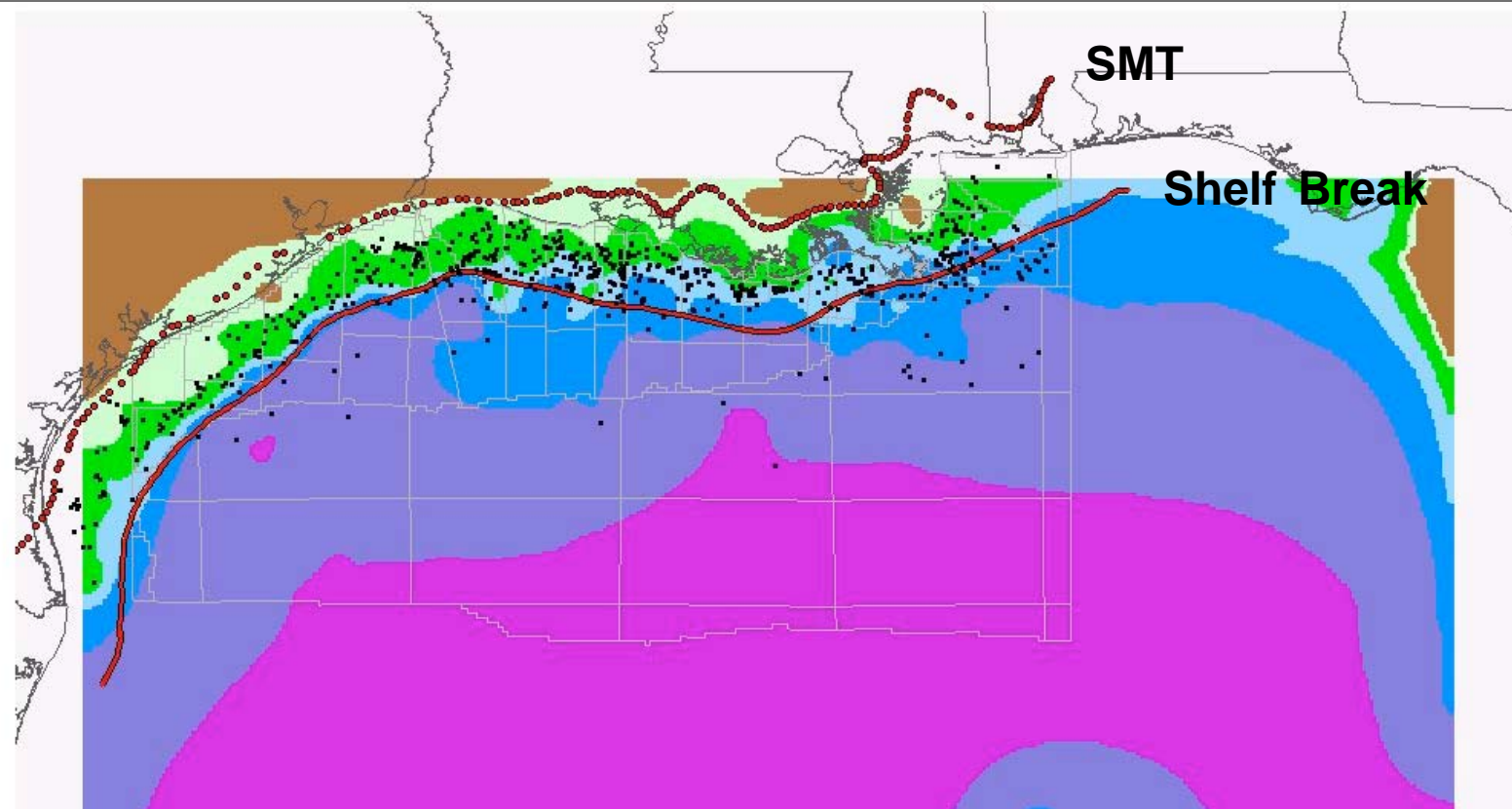
- 39 grid files (\*.txt)
  - “raw”, 1X, and 3X
  - 3X used in projects
- 11 diff. SMT (\*.shr) files
- 13 well location files

## GBDS Paleobath. project

- 13 paleobath. surfaces
- 13 layouts



PB1



### MMS Marine Environment Classification

Code	Zone	Depth Range (ft)
1	Transitional Inner Shelf	0 - 080
2	Middle Shelf	80 - 328
3	Outer Shelf	328 - 656
4	Upper Slope	656 - 1640
5	Lower Slope	1640 - 6581
6	Abyssal	> 6581

after Tipsword et al., 1966

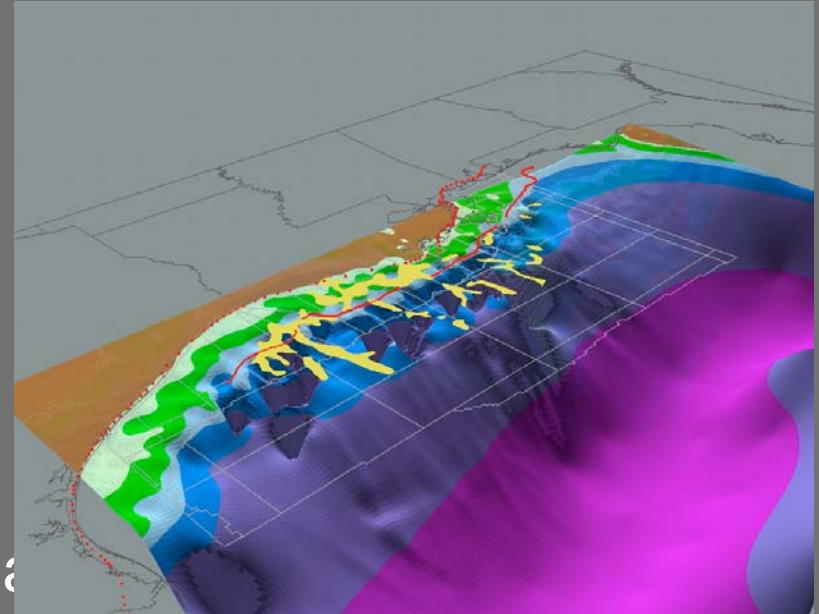
# 3D Paleobathymetry

## GBDS paleobathymetric project

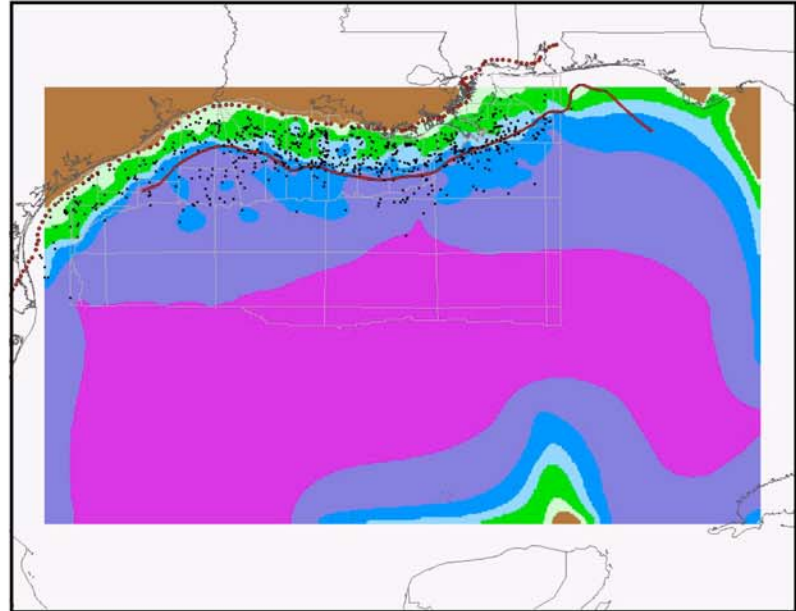
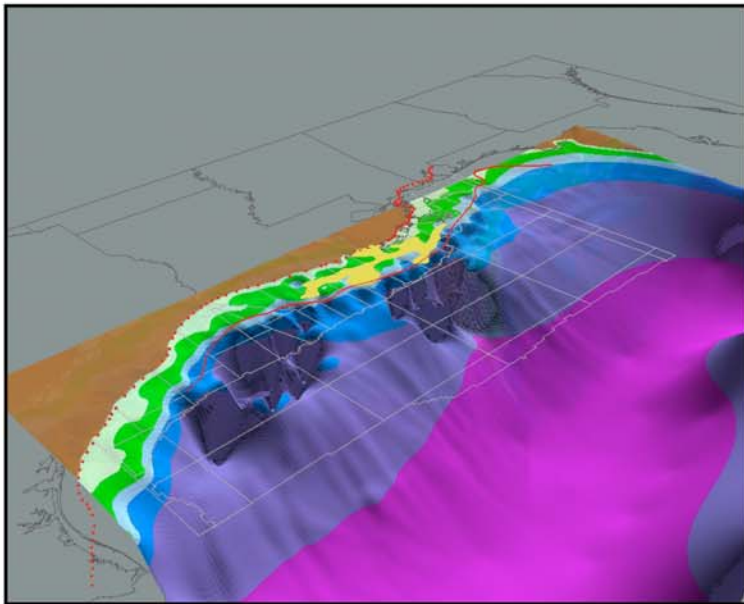
- 13 image files

### 3D Analyst extension

- View grid data in 3D
- Manipulate surface
- Add GBDS thematic overlaid



PGa

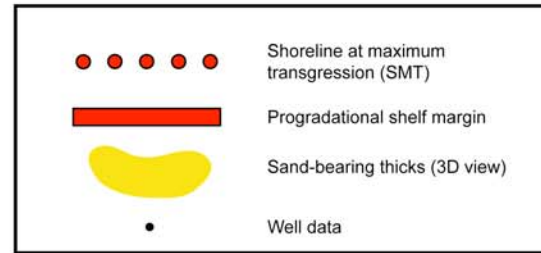


**MMS Marine Environment Classification**

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after Tipsword et al., 1966

### PB1 Paleobathymetry



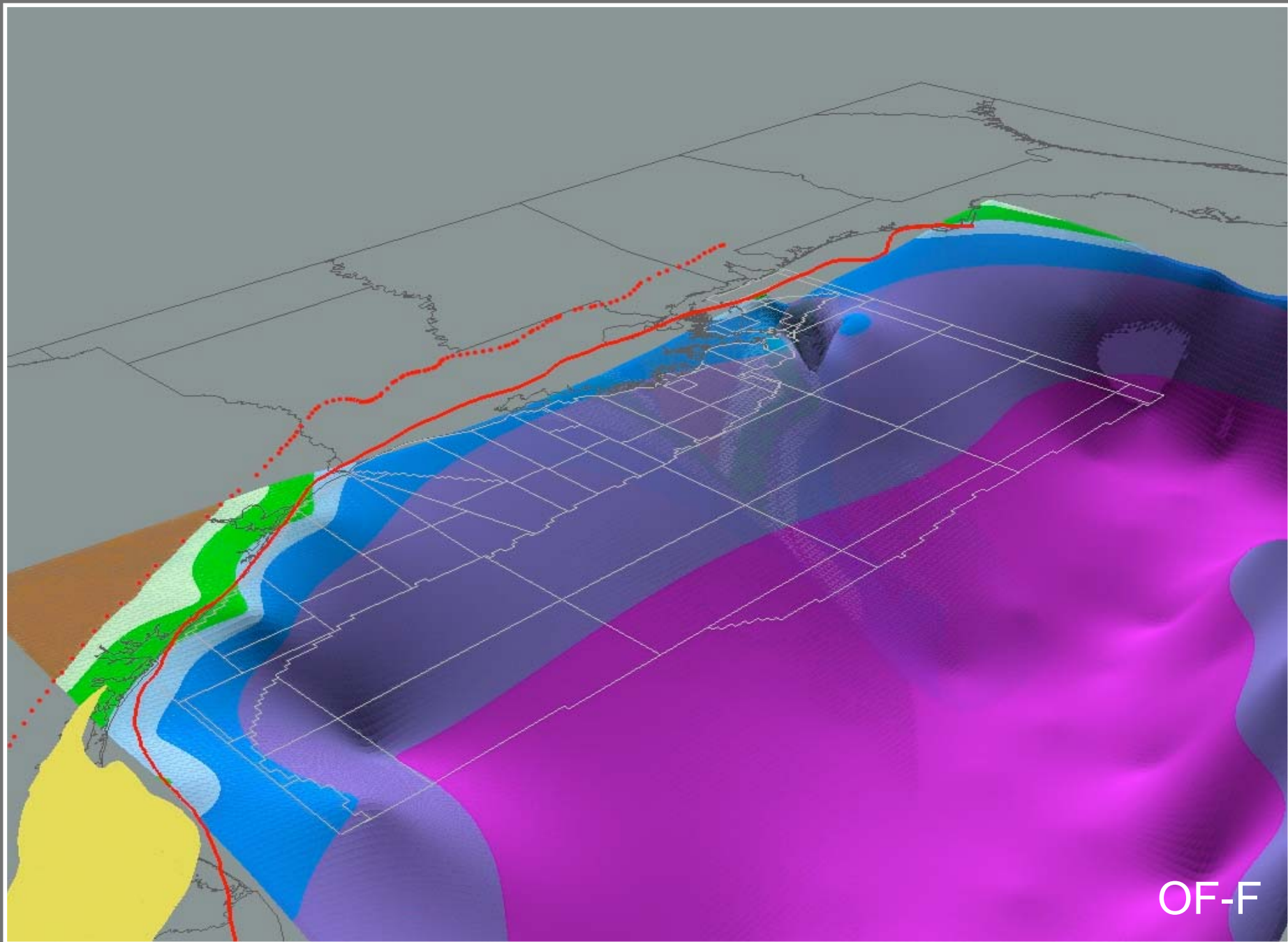
20 September 2002

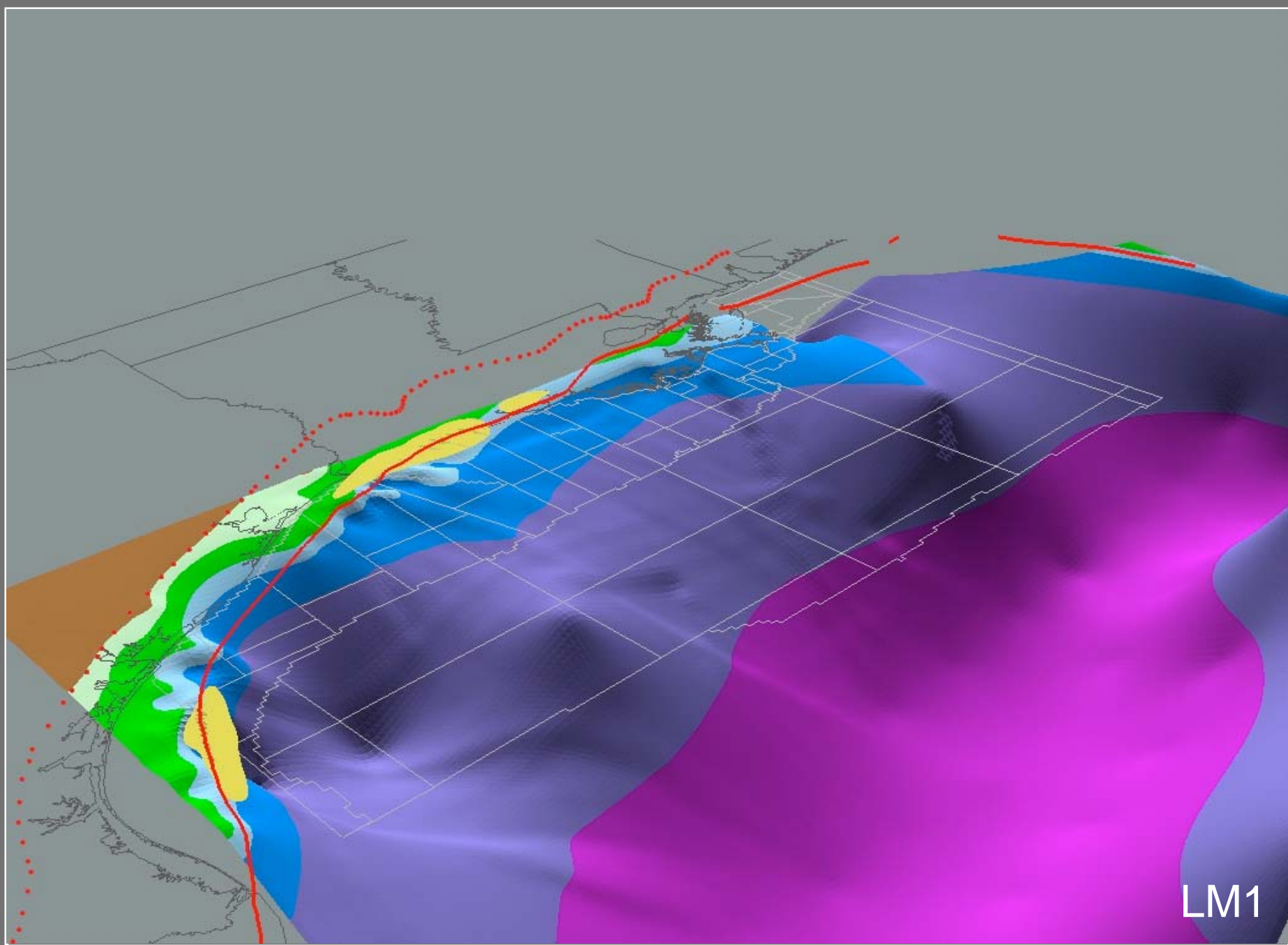
PB\_PB1

Folio Example

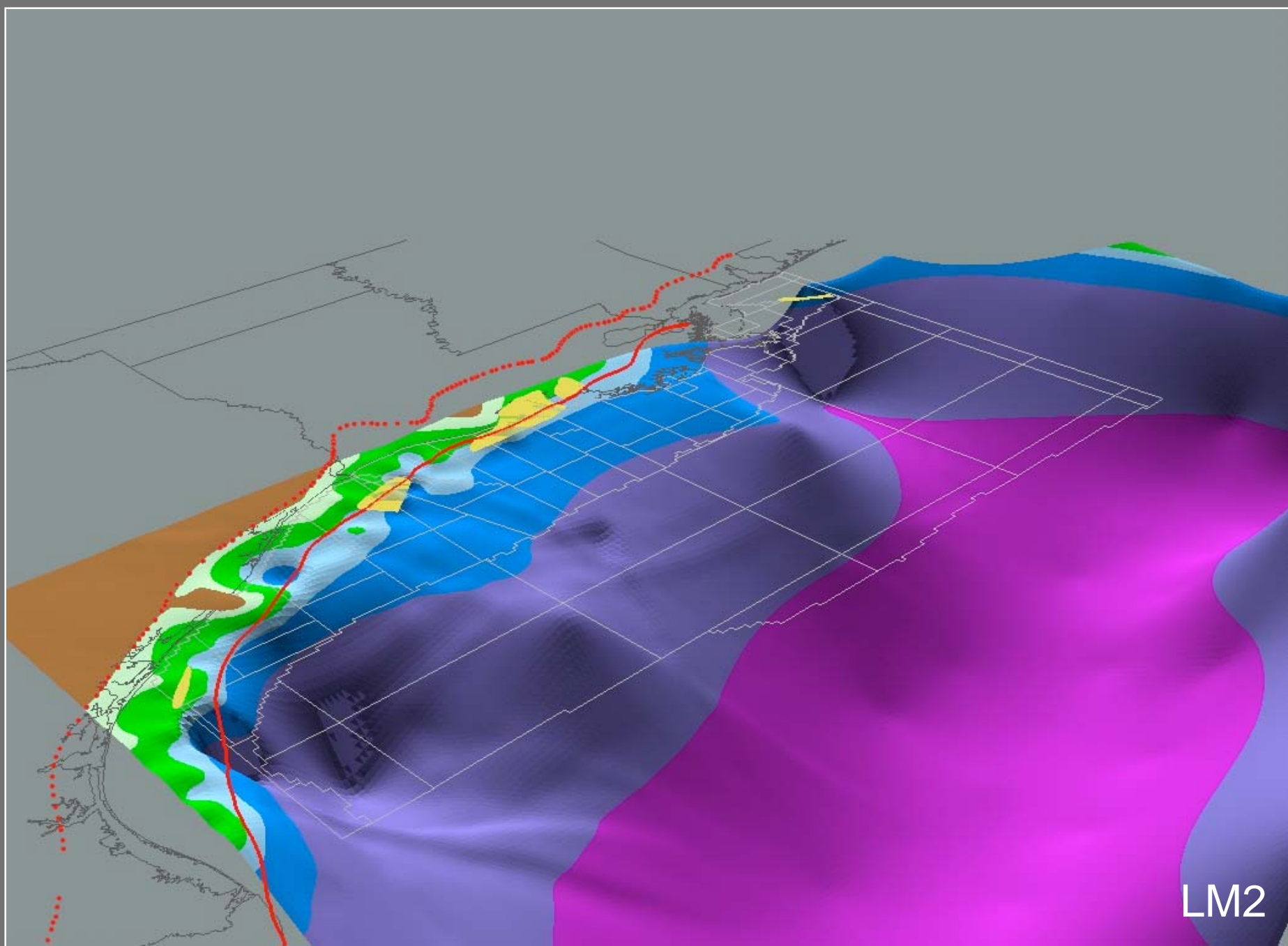
# Evolution of the Northern GOM

Oligocene - Pleistocene

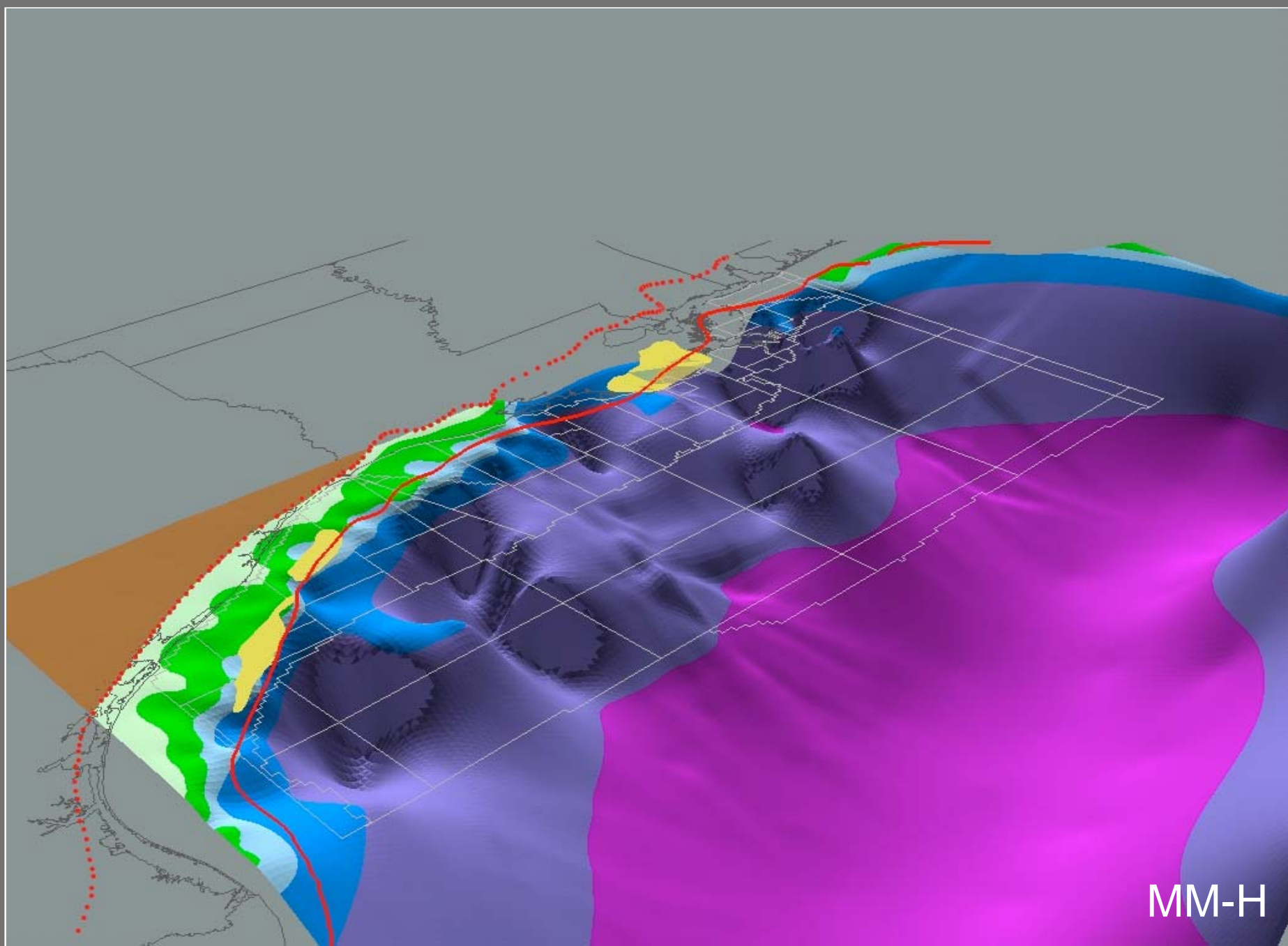




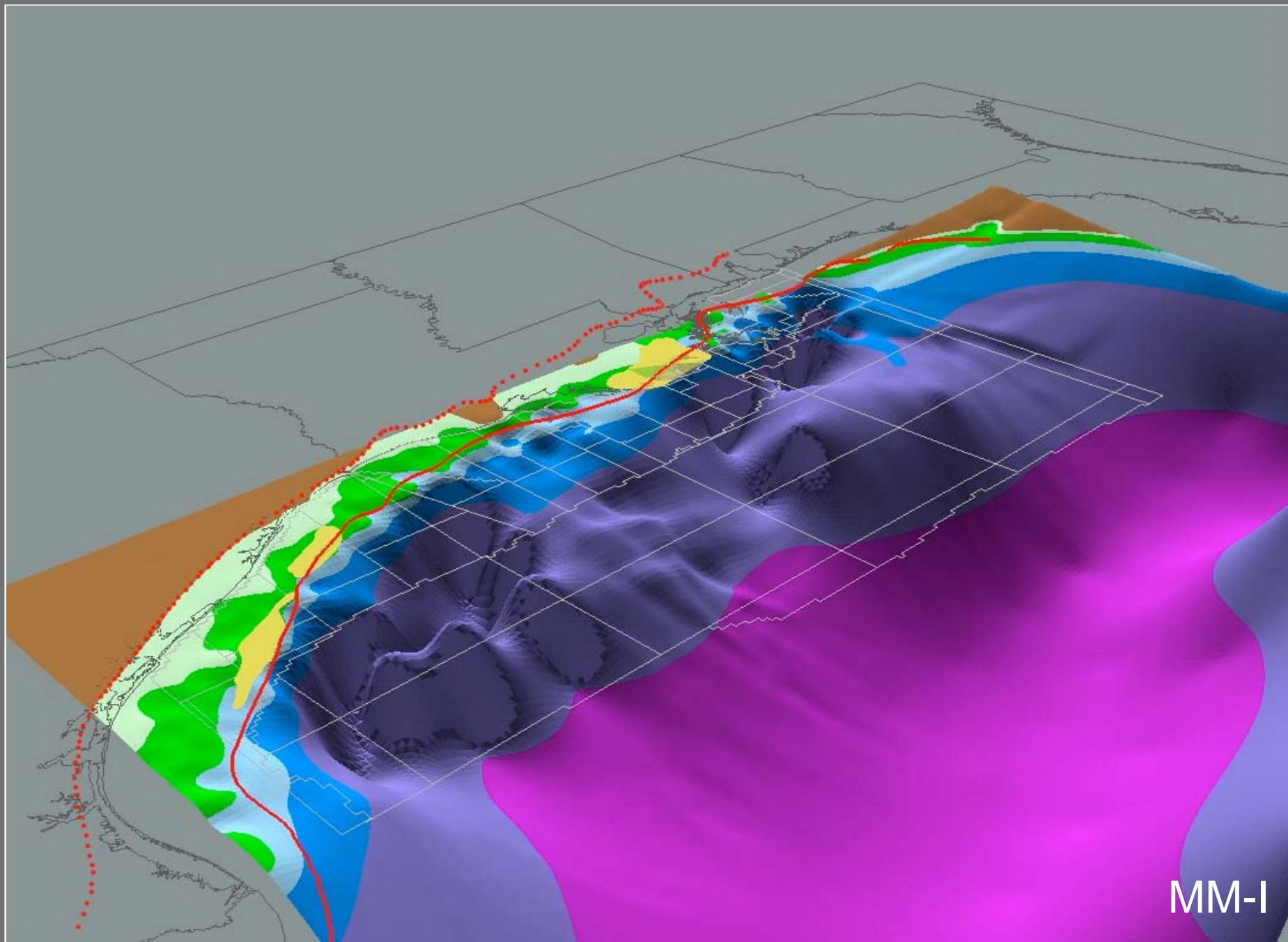
LM1



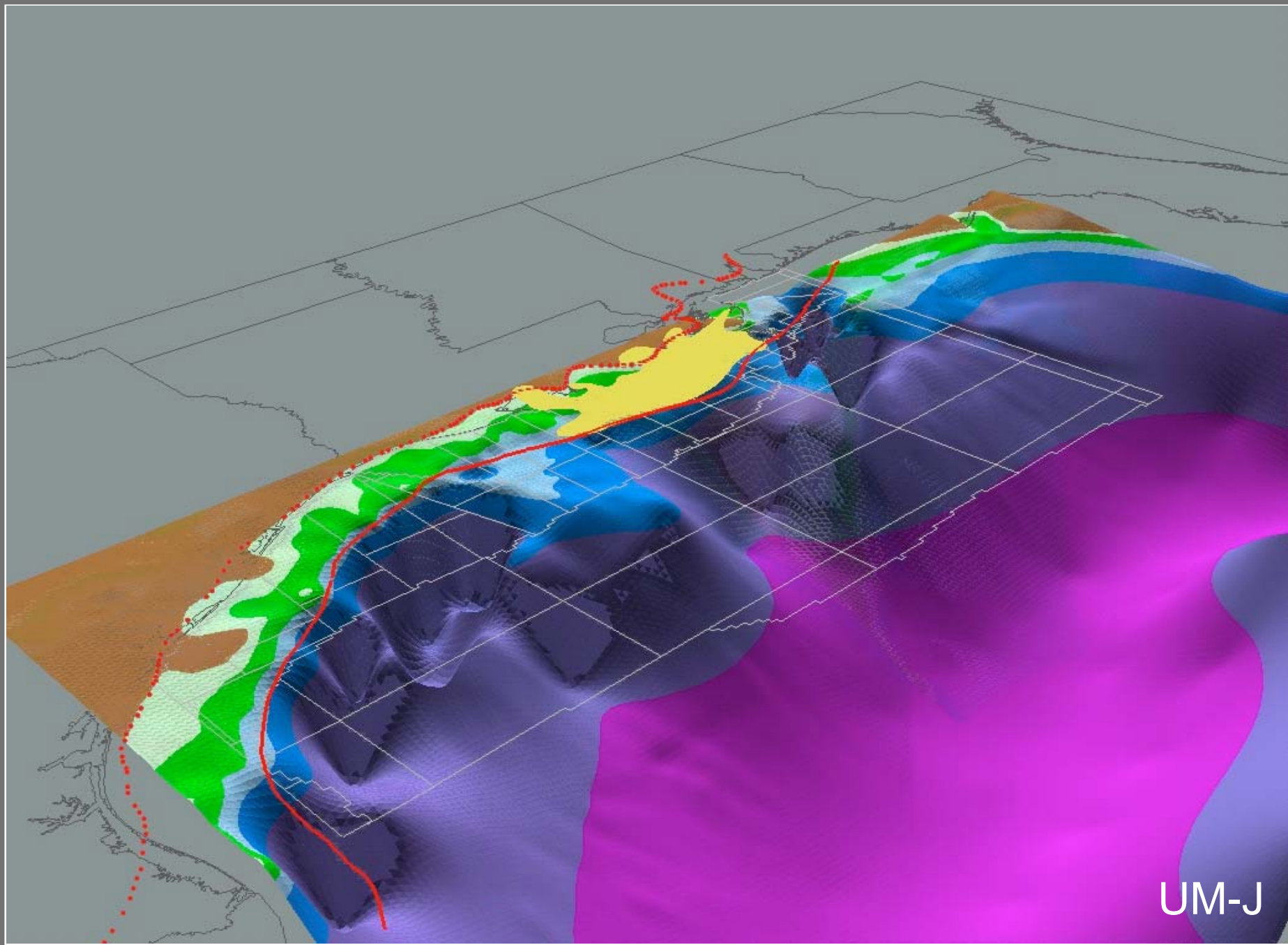
LM2



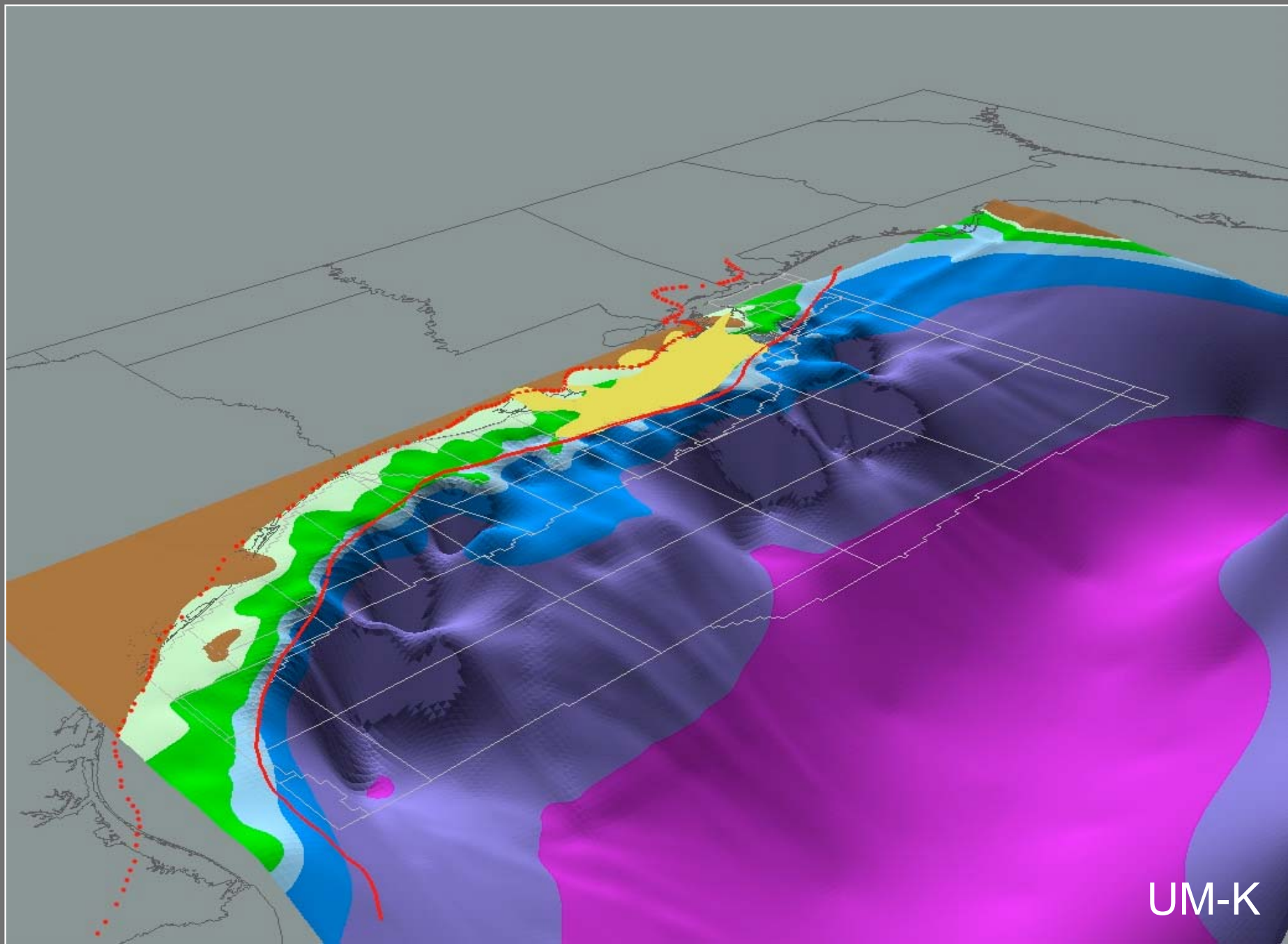
MM-H



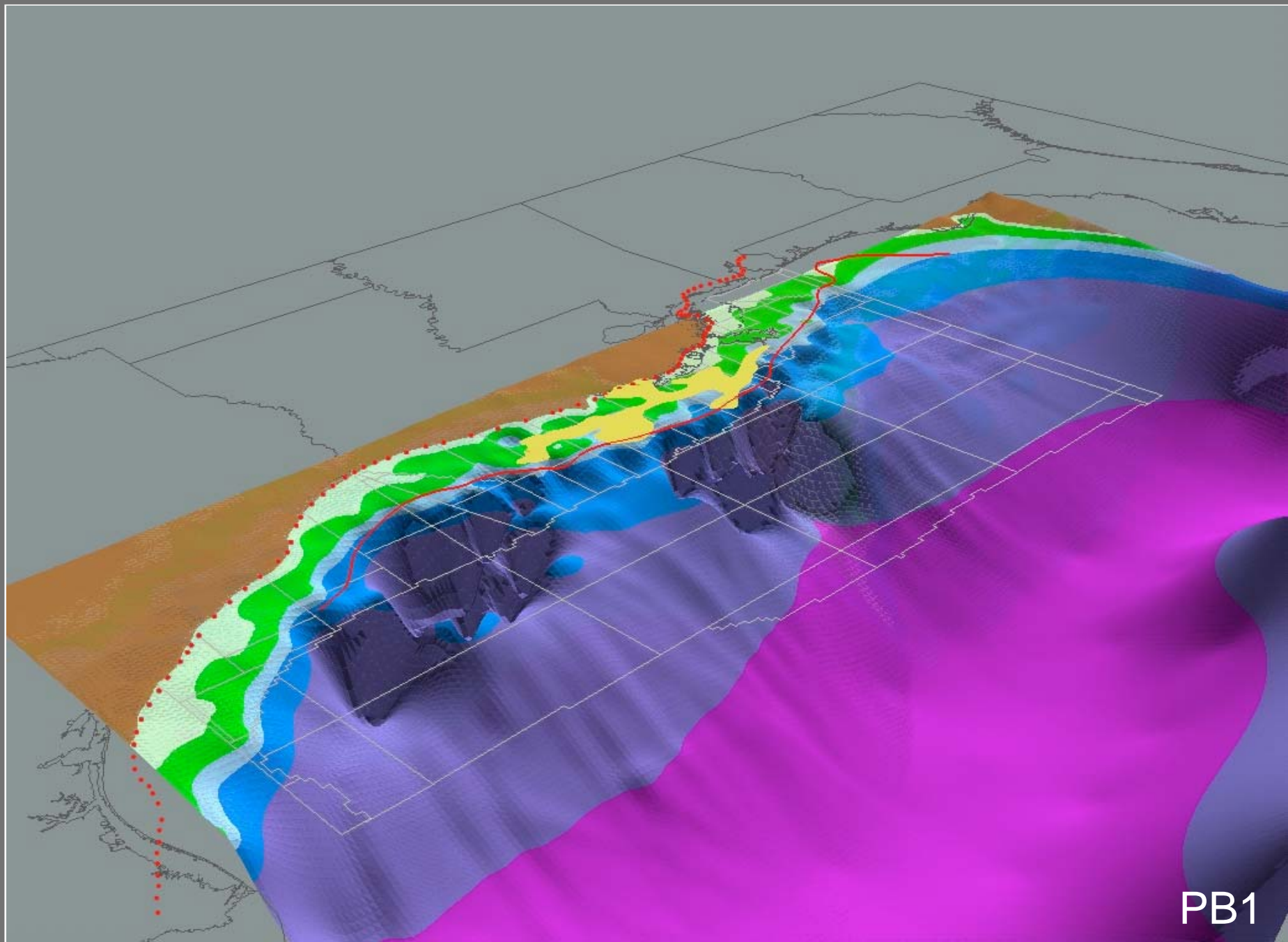
MM-I

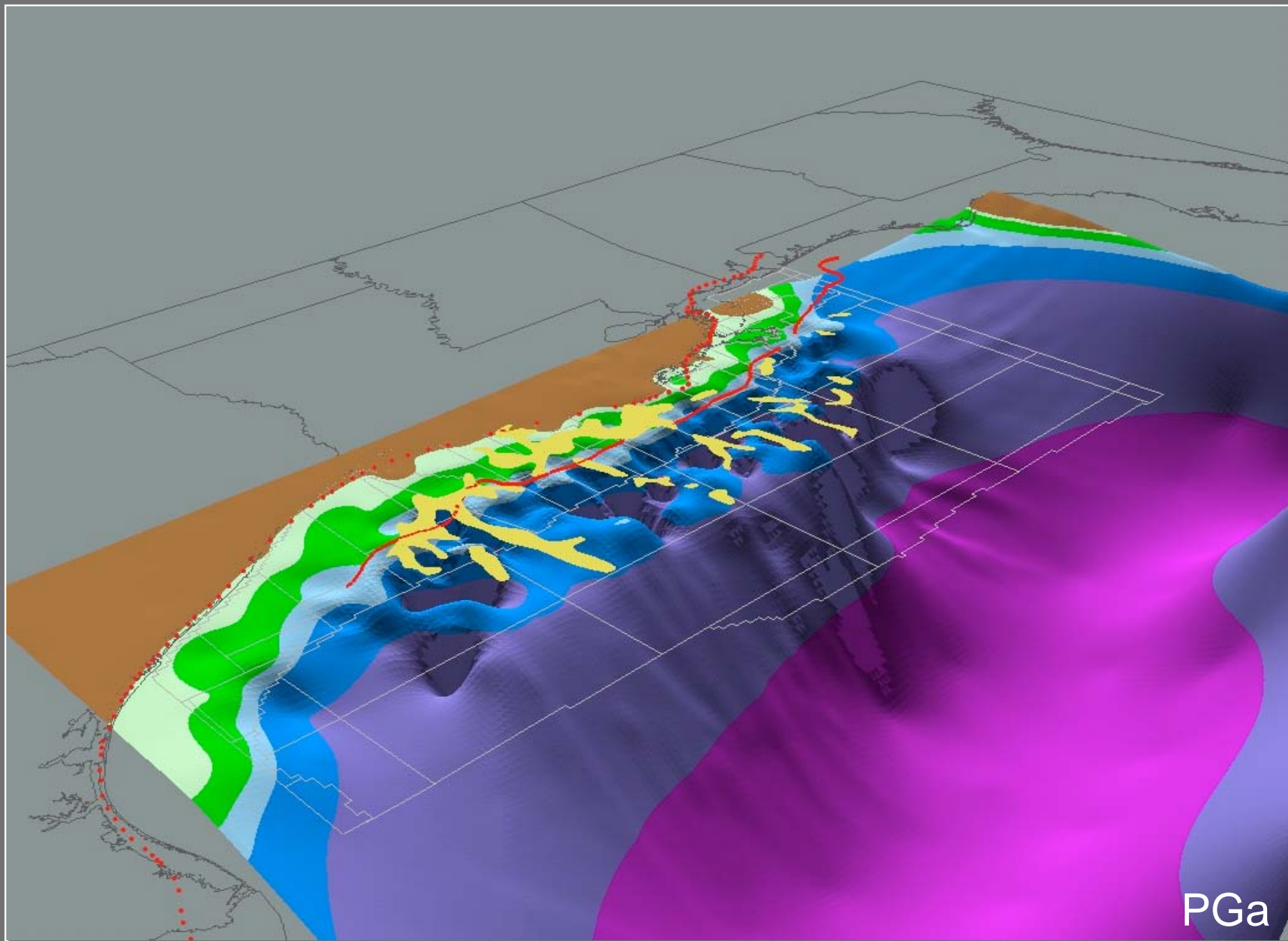


UM-J

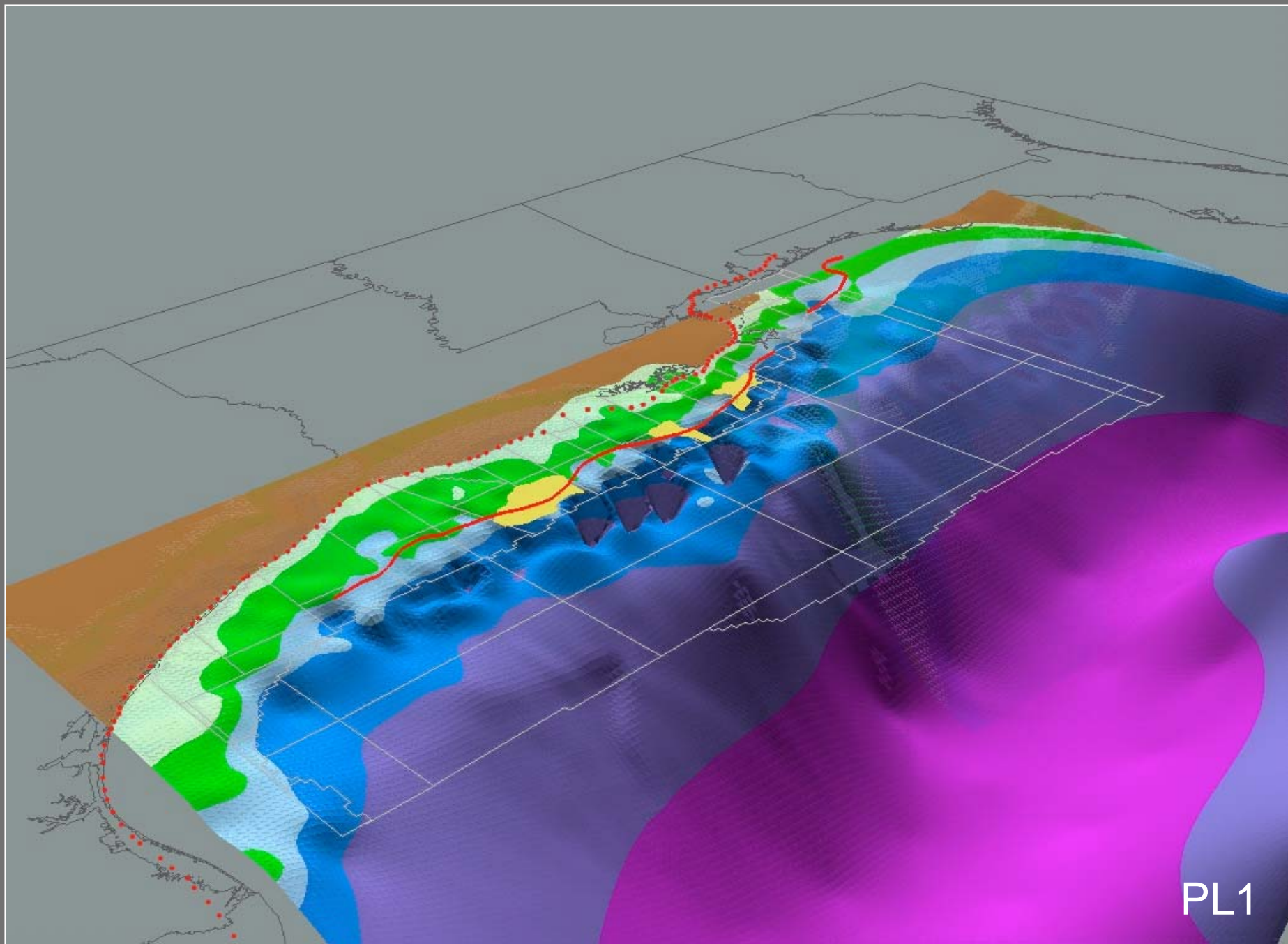


UM-K

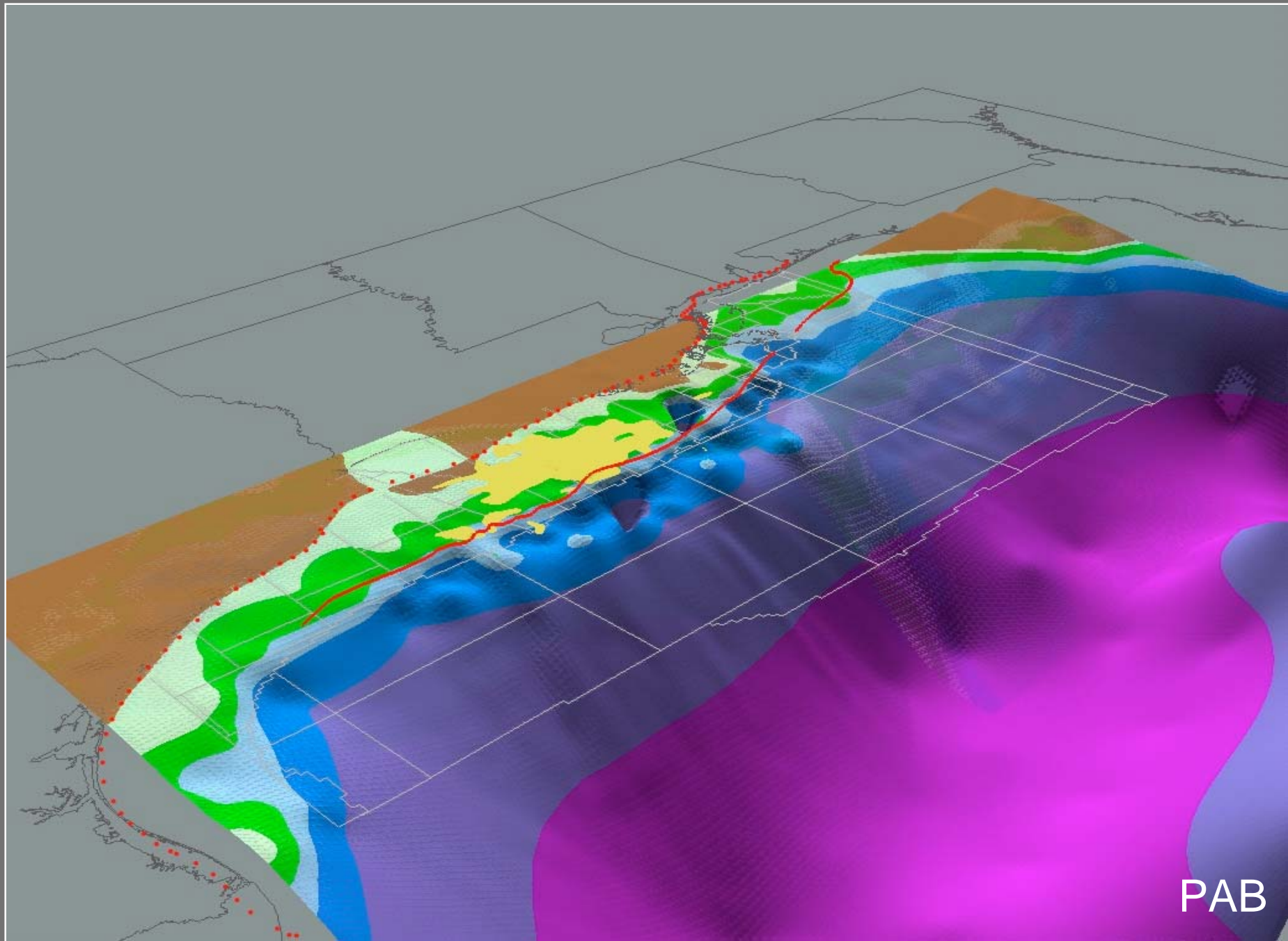




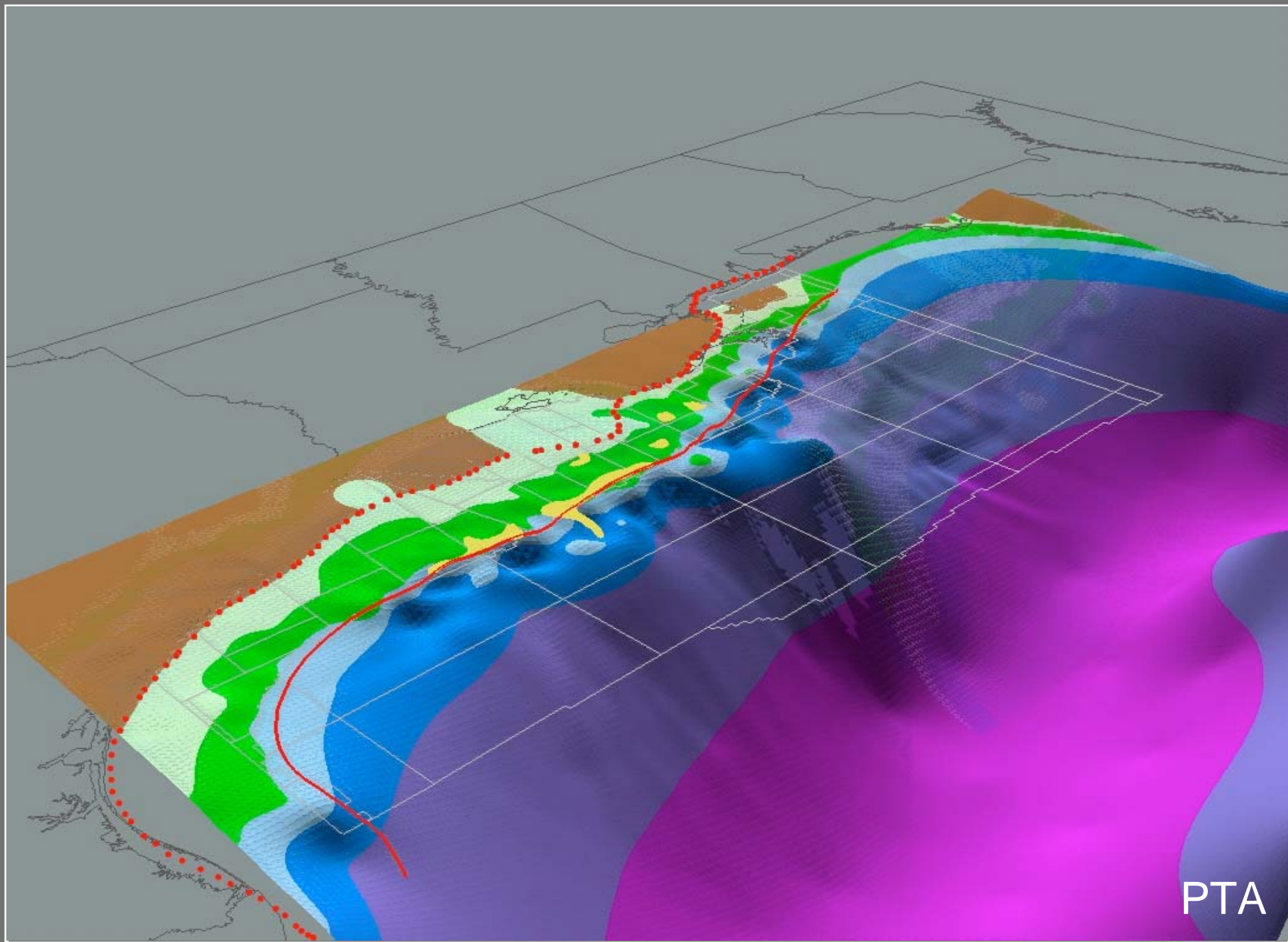
PGa



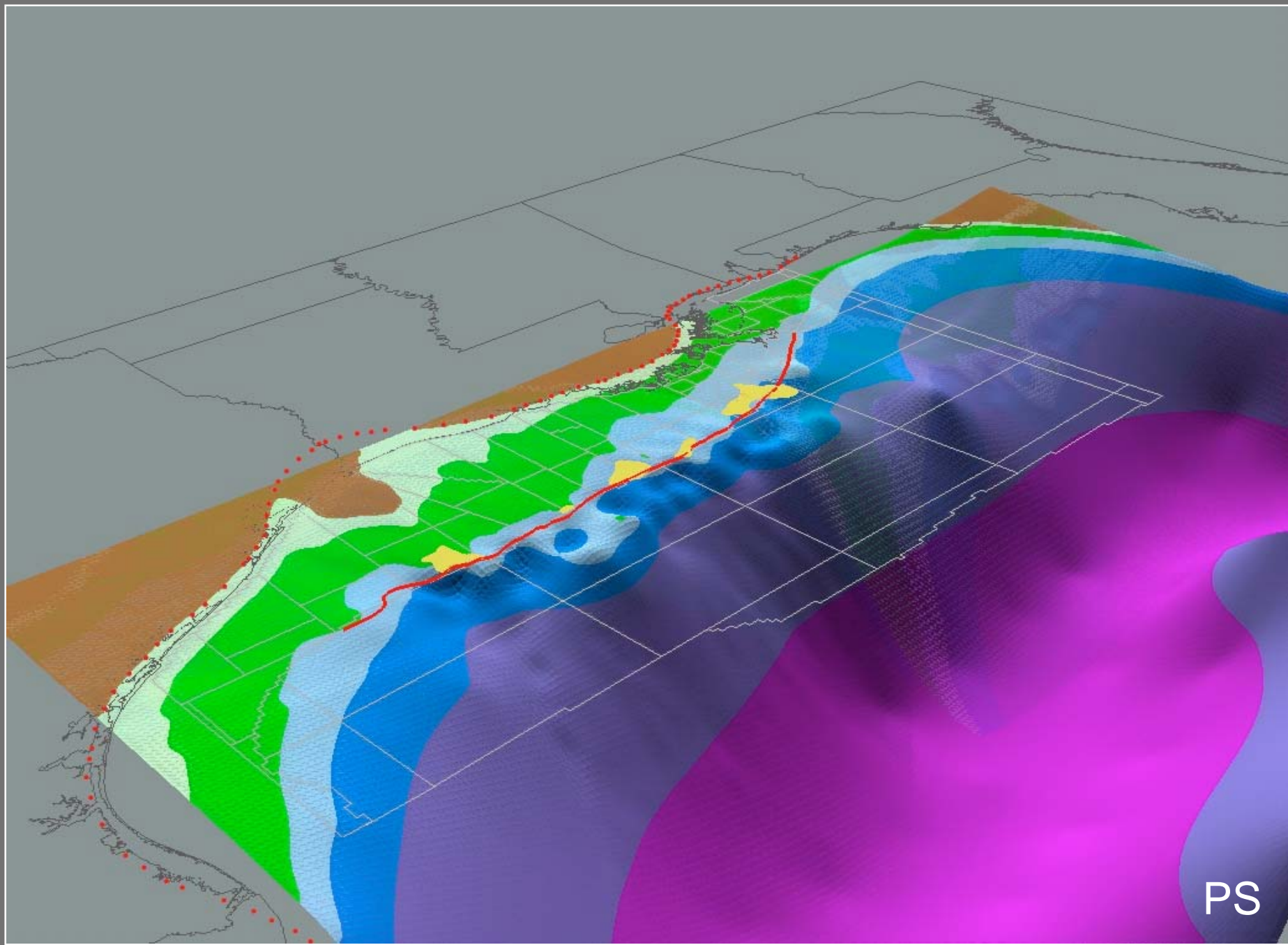
PL1



PAB



PTA



PS

# Derivative Maps

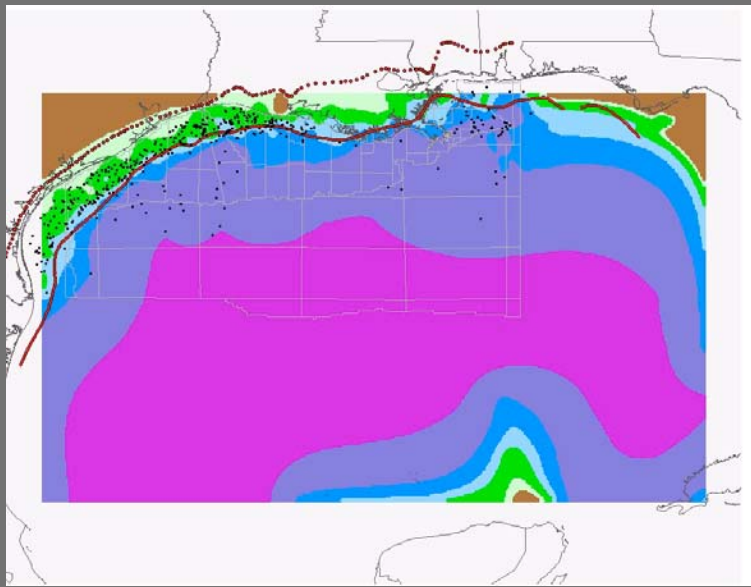
# Paleobathymetric Surface Difference (“Doppler”) Maps

Uses GBDS grid data (\*.txt files)

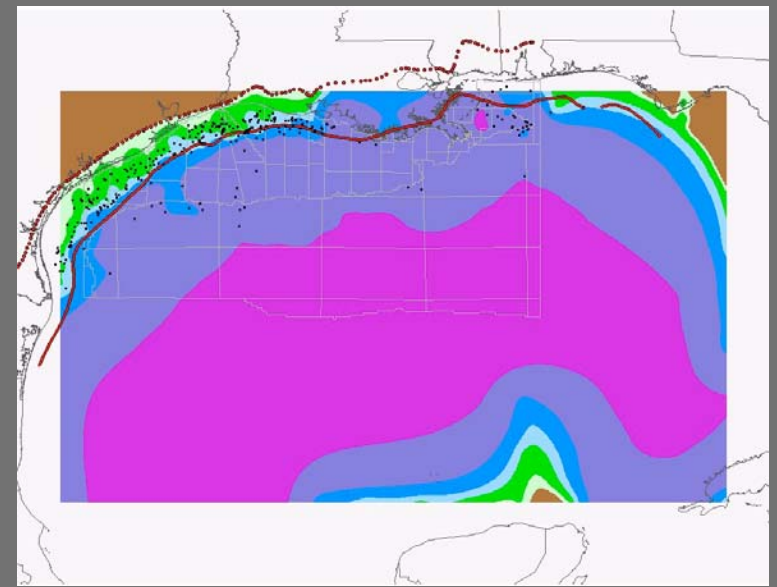
Grid algebra

- ArcView Spatial Analyst Extension
- Surfer8
- Younger minus older paleobathymetric surface depth (e.g., MM-I - MM-H)

**Identifies areas of apparent shoaling and apparent deepening**



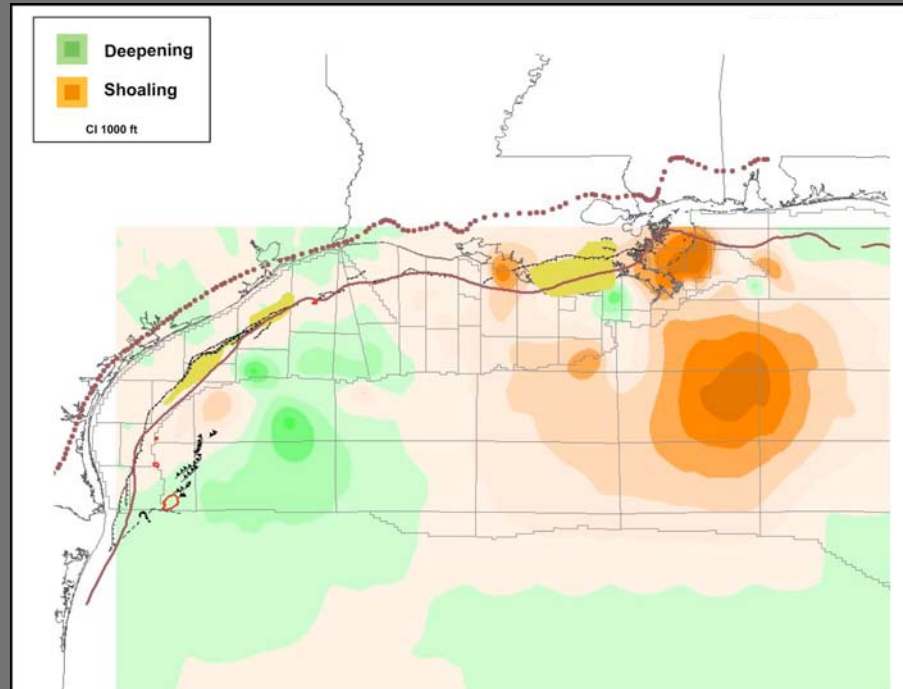
MM-H



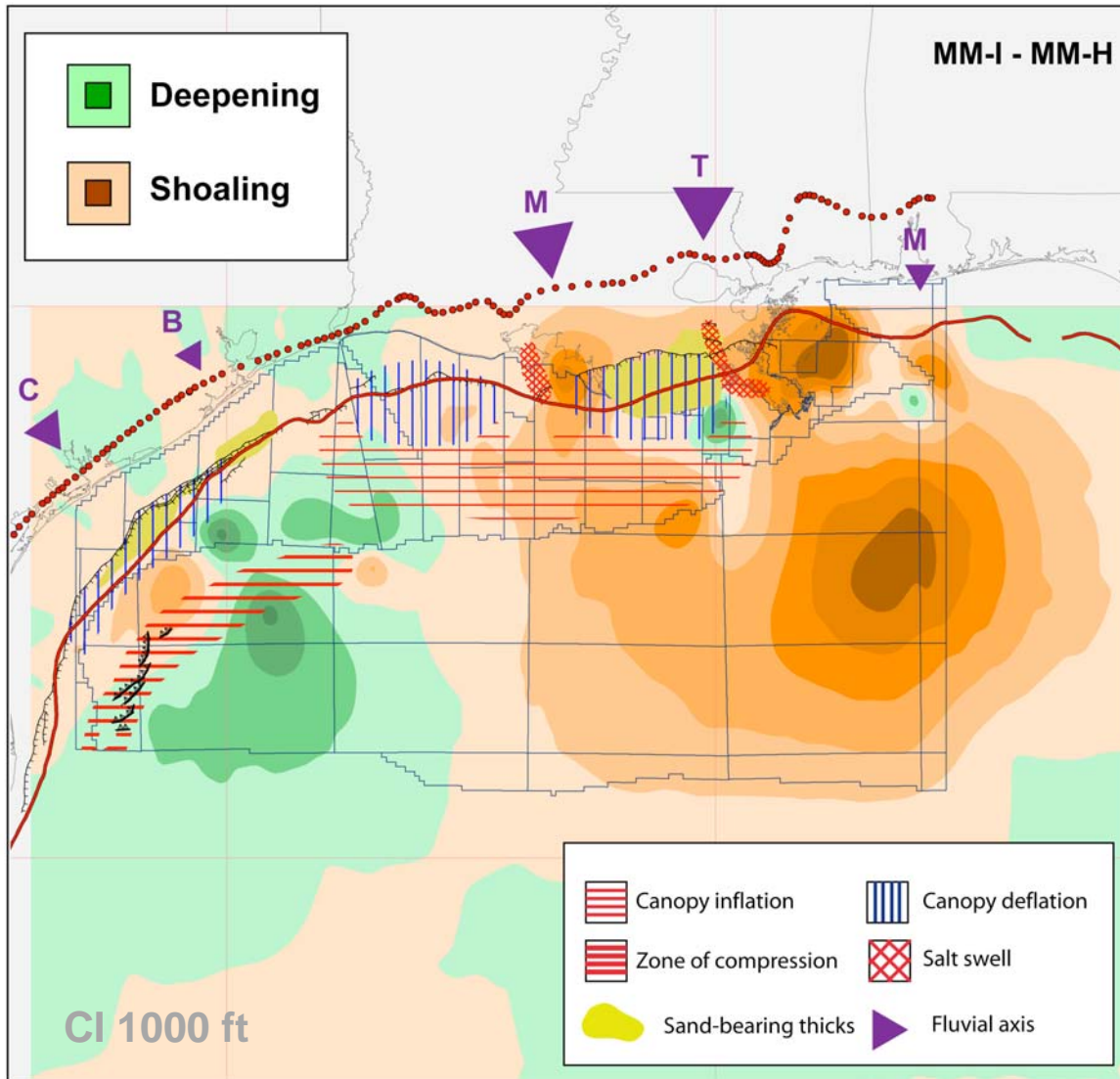
MM-I

$$= (\text{MM-I}) - (\text{MM-H})$$

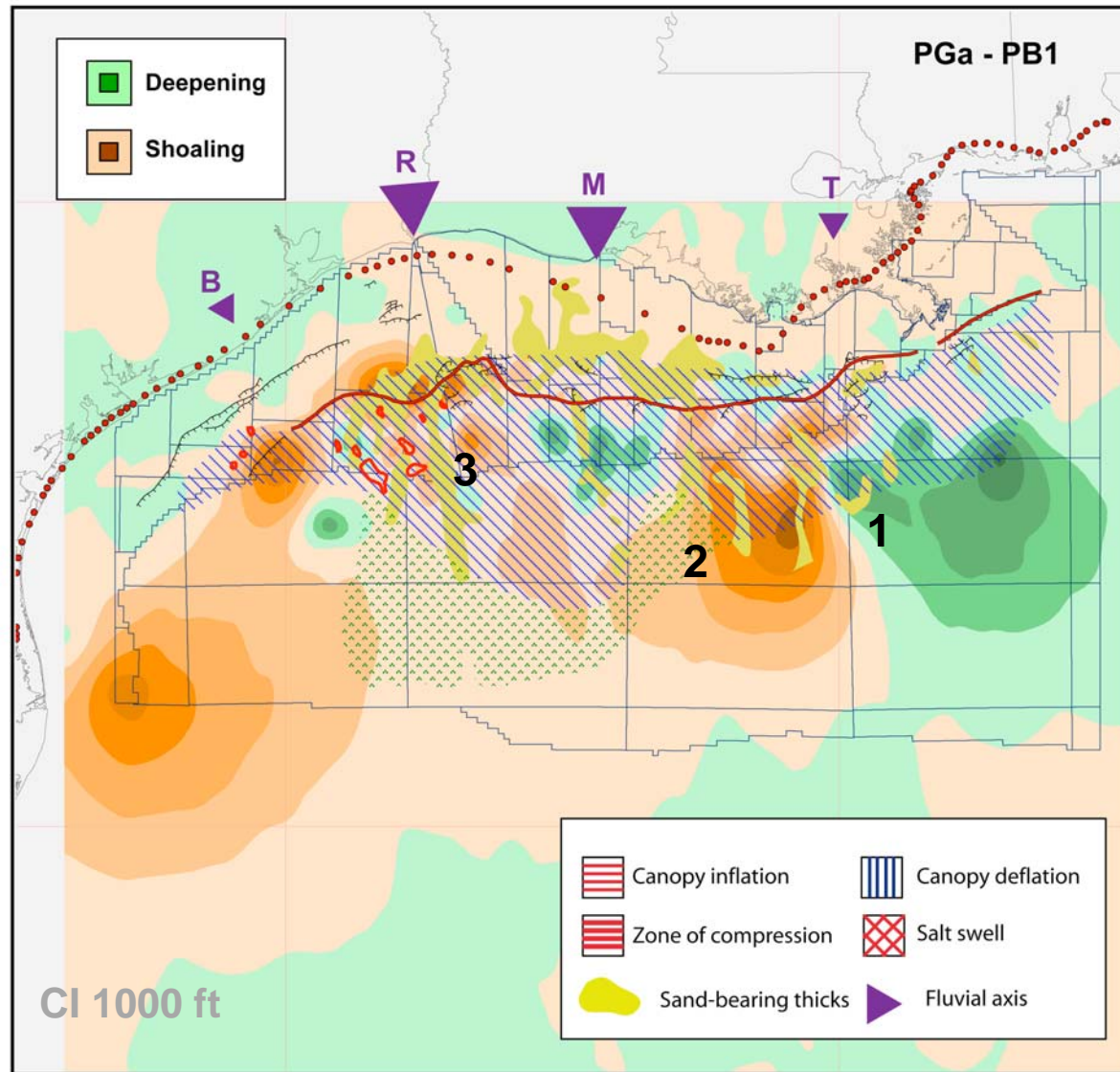
Apparent  
paleowater  
depth  
difference



# GBDS Overlays



- SMT
- Shelf margin
- Active faults
- Salt features
- Sand-bearing thicks
- Fluvial axes



1. Starved abyssal plain

2. Shelf retreat, down slope transport of sediments

3. Minibasin filling