An Overview of the GOM Hydrate JIP

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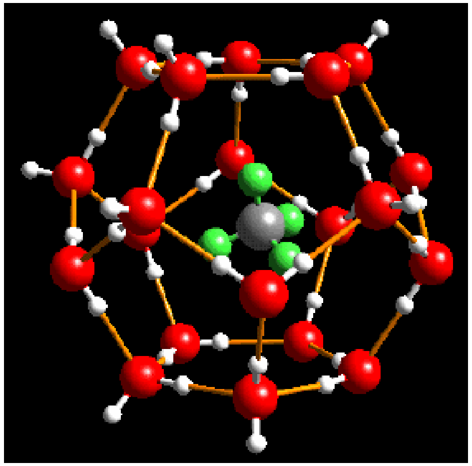
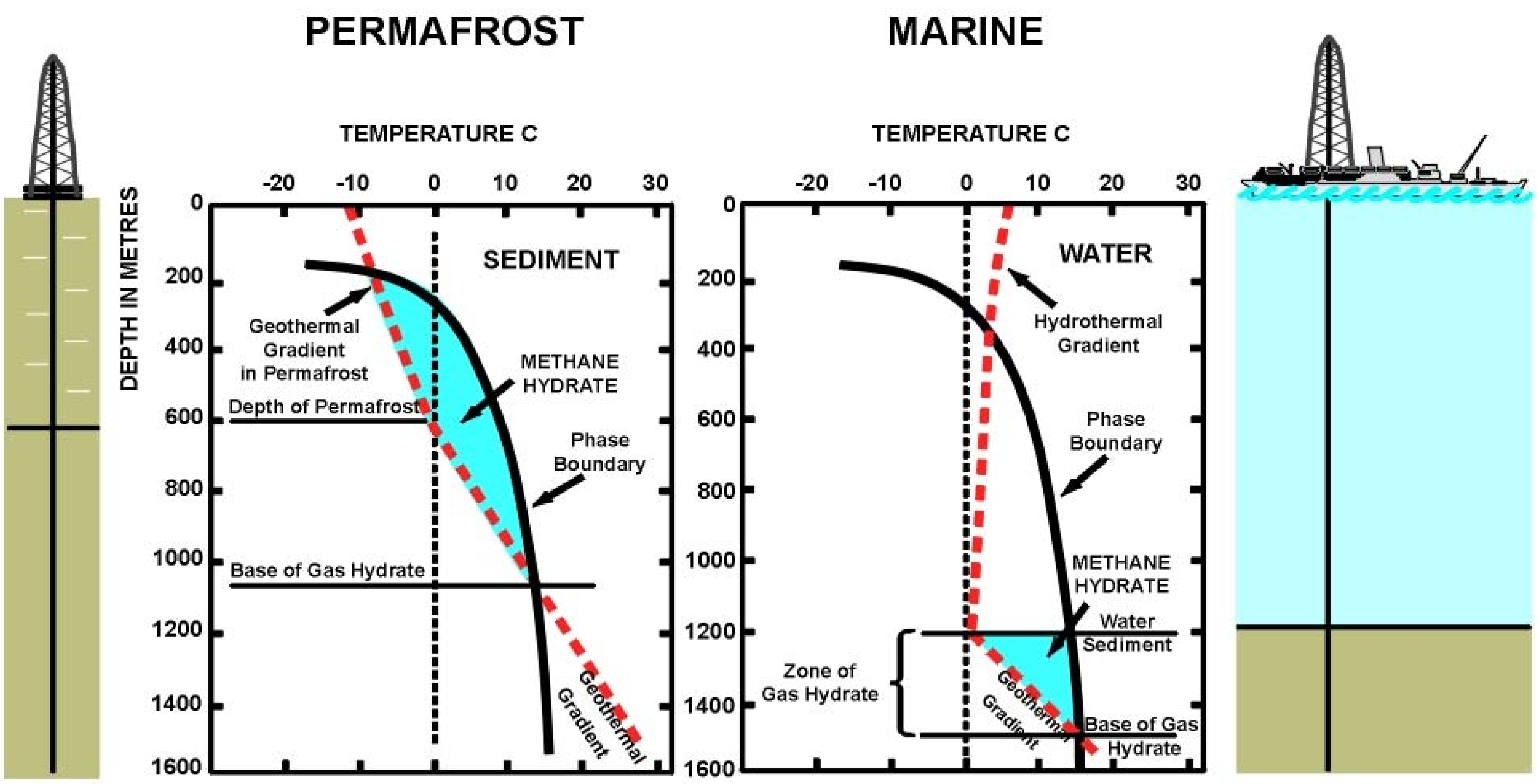
Hydrates 101



- Ice-like solids
- 160-170 scf gas/cf hydrate
- Methane, ethane, CO_2, H_2S, etc.
- Stable at high pressures, low temperatures
- Occur in nature – oceanic, permafrost environments
- Hydrates burn
- May cause flow assurance problems
- May cause seafloor stability problems

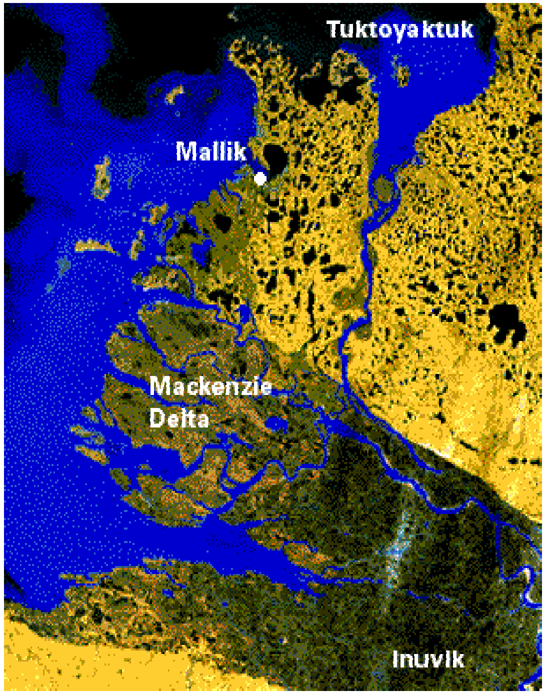
Hydrates Occur When PVT Conditions Allow



Hydrates are Widely Distributed in Arctic and Marine Sediments

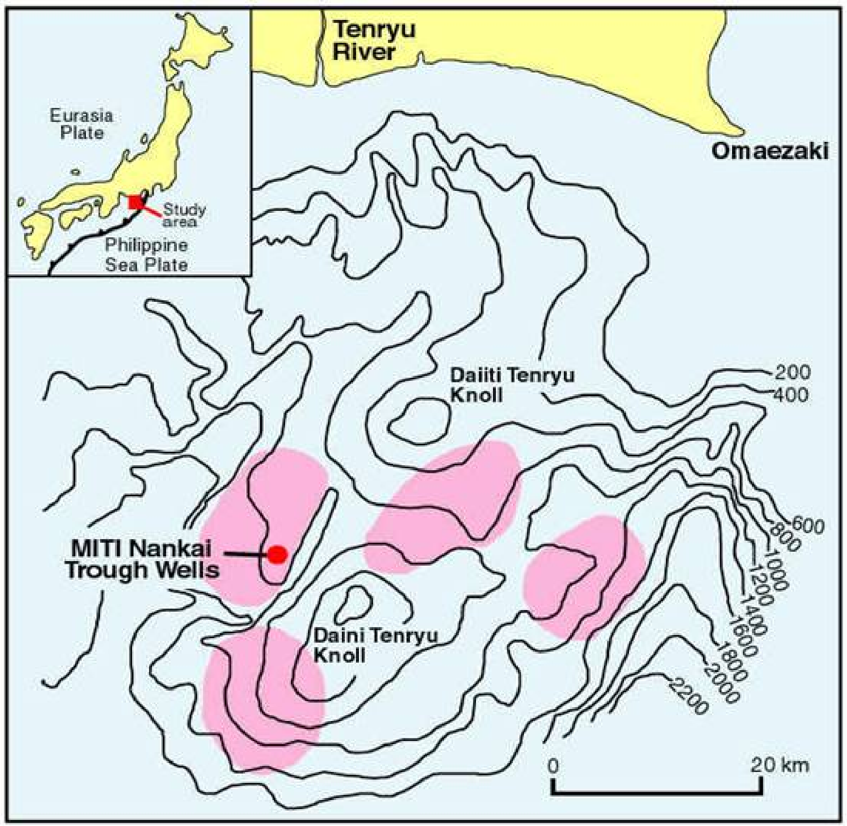
Latest estimates of hydrate resources suggest that they are at least 5 times larger than all conventional gas.

First Production from Arctic Hydrates - Mallik Well, Canada, Mackenzie Delta March 2002



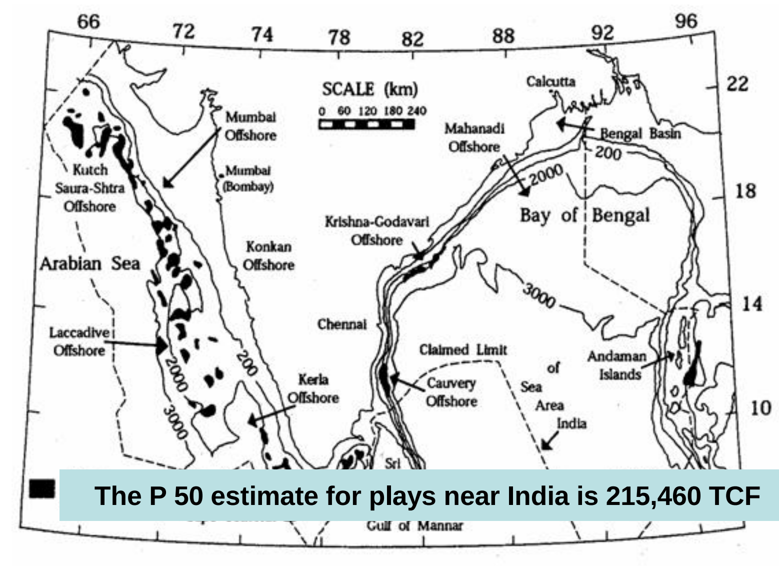
- Mallik alone contains 4 TCF of natural gas trapped in form of hydrates
- Resource estimates for US: 200,000 TCF of gas in hydrates – offshore & Alaska
- In comparison, Total recoverable methane resource base in US from conventional oil and gas deposits estimated at 27,000 TCF => Hydrates are potentially an enormous energy resource!!

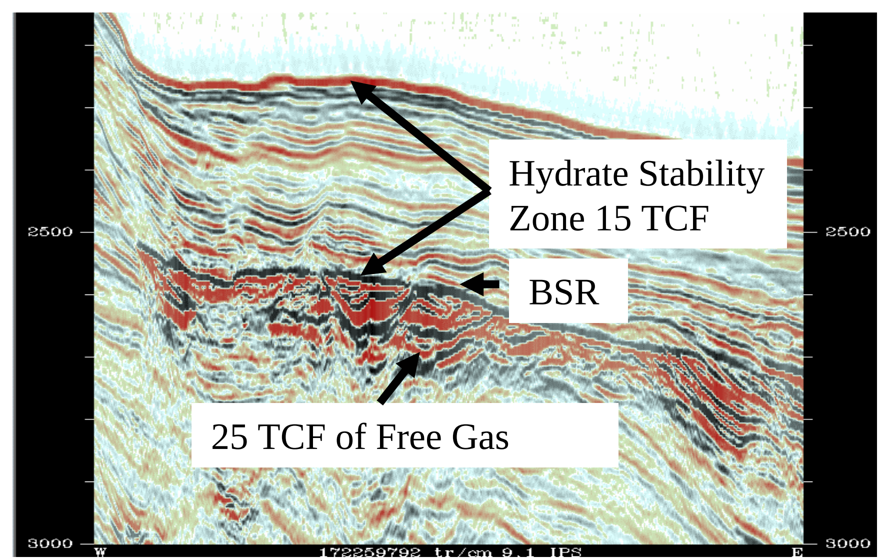
Japan and India Have Large Hydrate Accumulations



Total hydrate resource for Japan is estimated to be between 700 and 4900 TCF

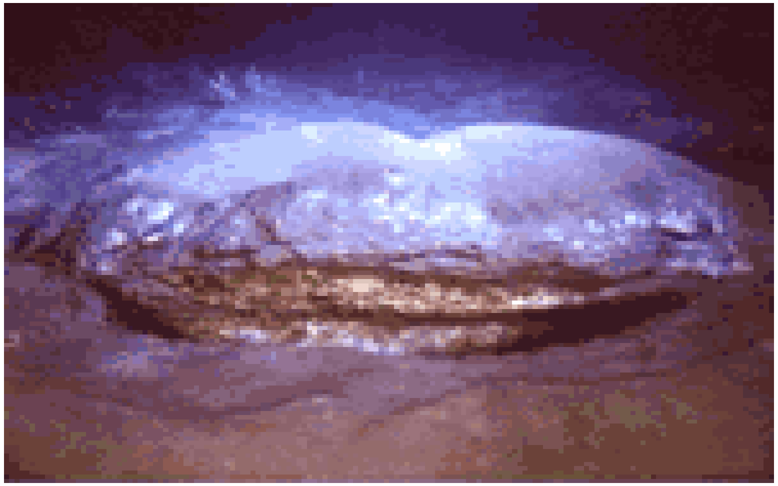
JNOC drilled 16 exploration wells in the Nankai Trough in 2004 and plans on selecting production sites in 2006





Hydrates in GOM

Naturally Occurring Hydrate Mounds at the seafloor in the GOM



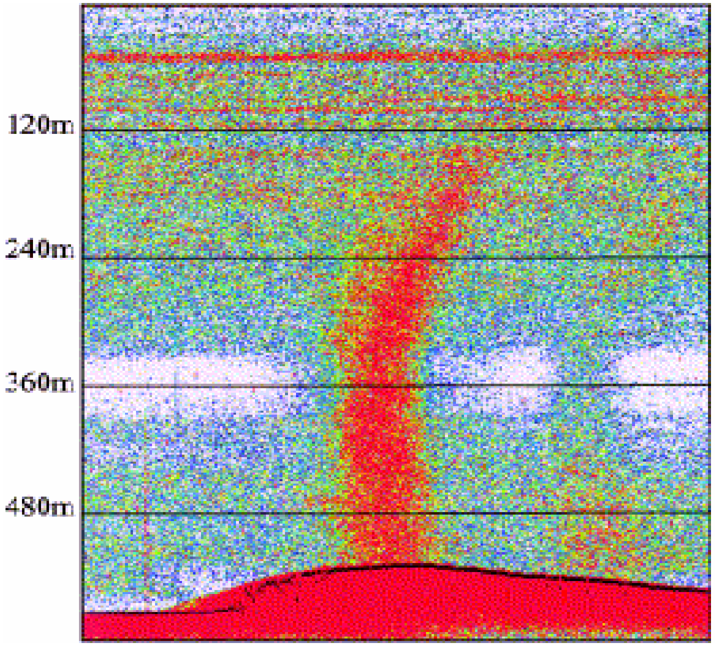
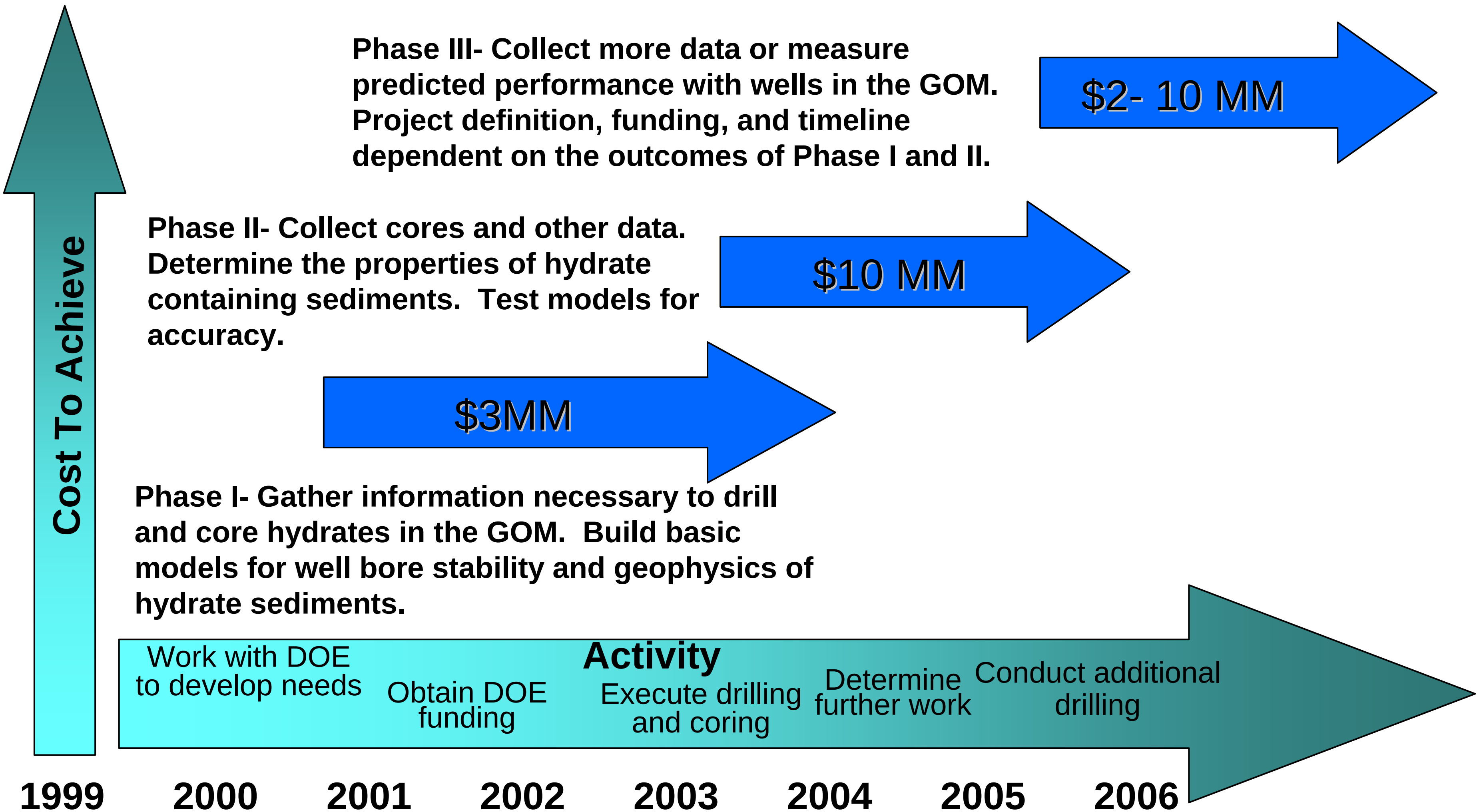


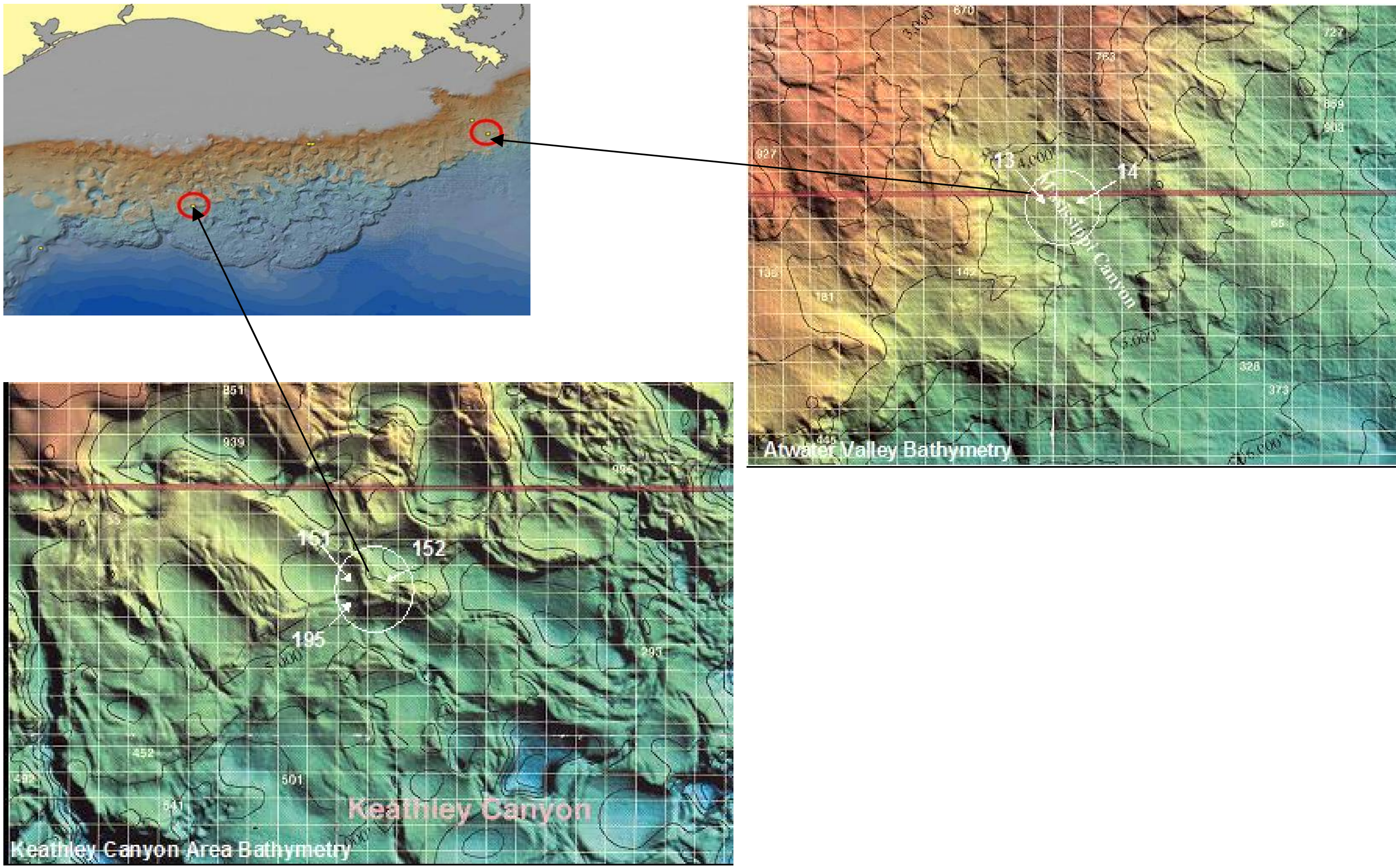
Figure 3-4 Echo sounder record of a gas bubble train entering the water column from gas vents on the GC 185 gas hydrate site. The mound-like seep feature is at ~540 m water depth, and the plume rises close to the sea surface (see vertical scale). The base of the plume is estimated to be ~600 m across. Over the site, gas bubbles 2-3 cm across breach the sea surface, associated with oil, demonstrating direct transfer of thermogenic greenhouse gas to the atmosphere (Sassen et al., 2001)

GOM Hydrate JIP Project Plan

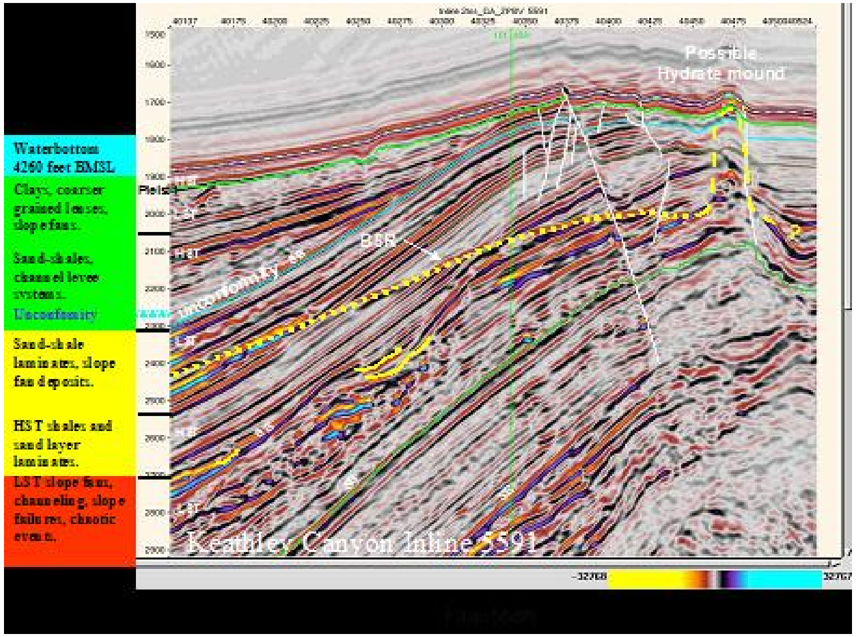
DOE Cost Share ~ 80%



2005 Coring Program

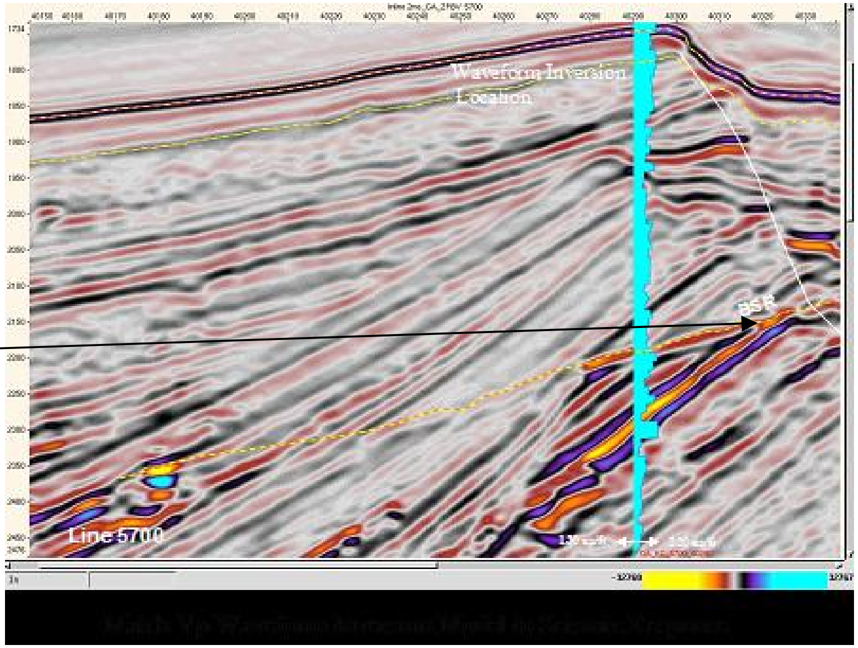


Keathely Canyon

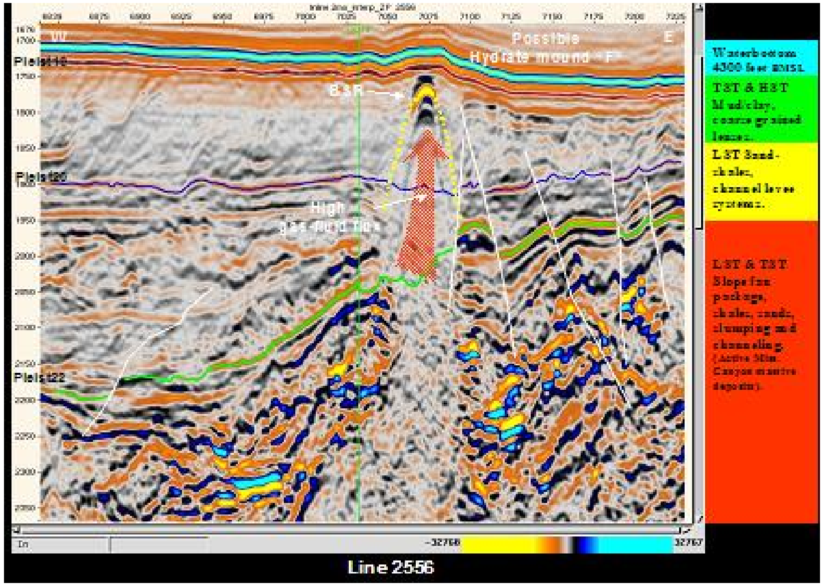


The pseudo-well logs predicted by the percruise seismic analysis will be compared to the actual logs and cores collected

Note how the gas sand is capped by the BSR



Atwater Valley



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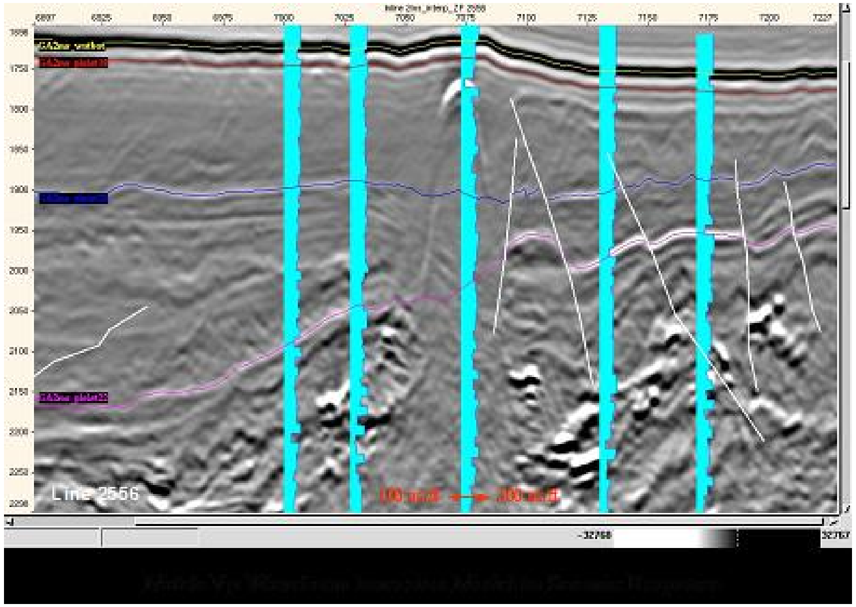


Cal Dive DSV *Uncle John*

Scientific Labs

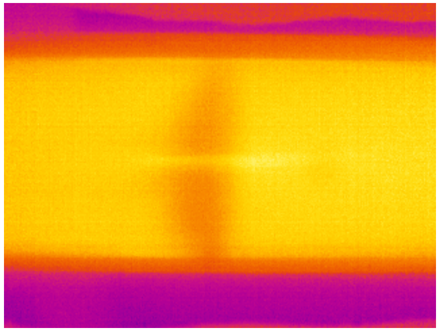
Various lab units were installed for scientific work:

- X-ray / CT Scan
- Geochemistry
- Core Logging
- LWD
- Core Handling

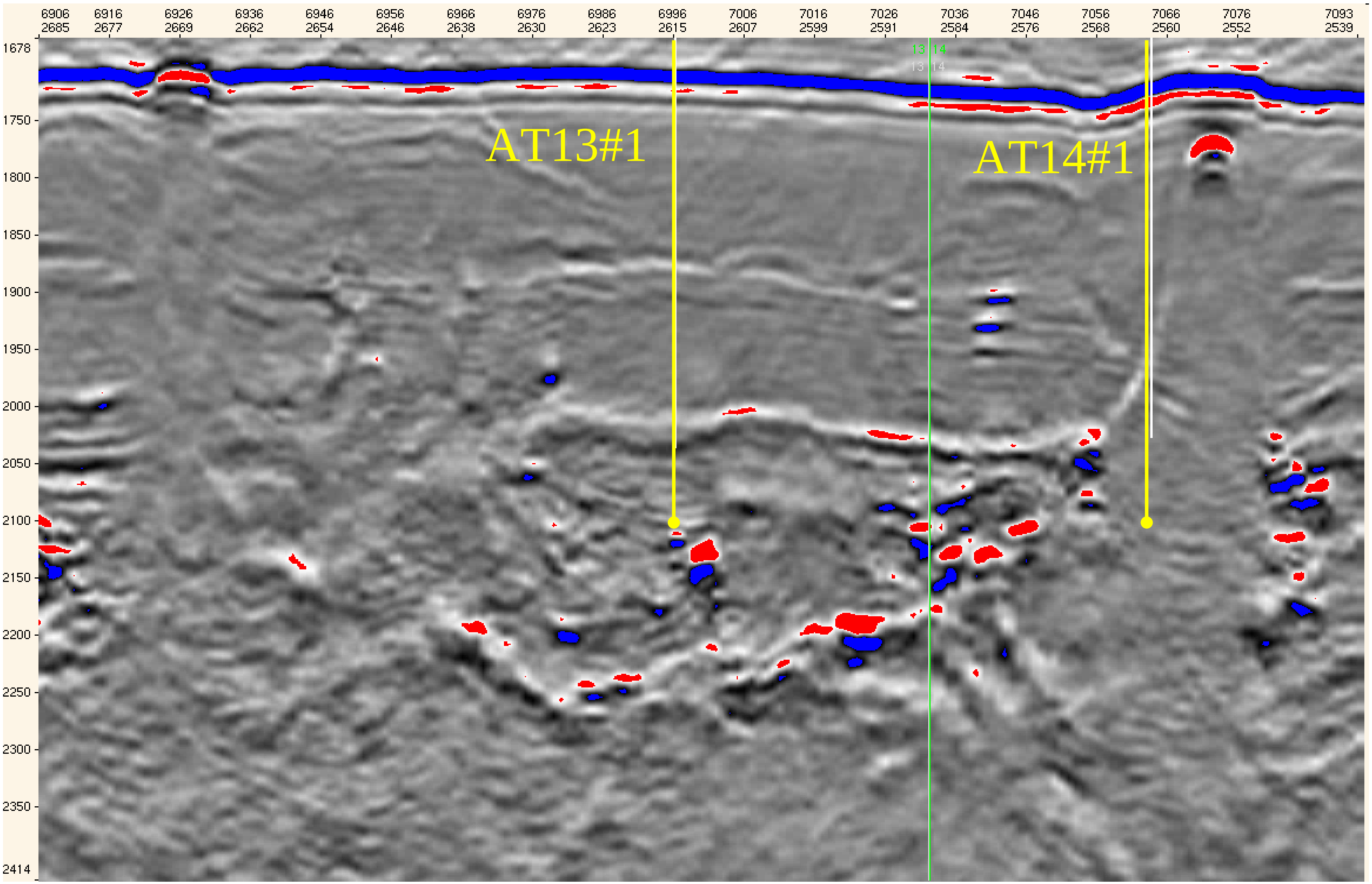
Staff at Work

Core Processing Container

- 40’ container with core rack handling area
- Kept at ~50 F with 2 refrigeration units
- IR camera
- Core measurement
- Head Gas samples
- Pore water samples
- P-Wave measurement
- Soil mechanics measurements

AT 13 #1 & AT 14 #1



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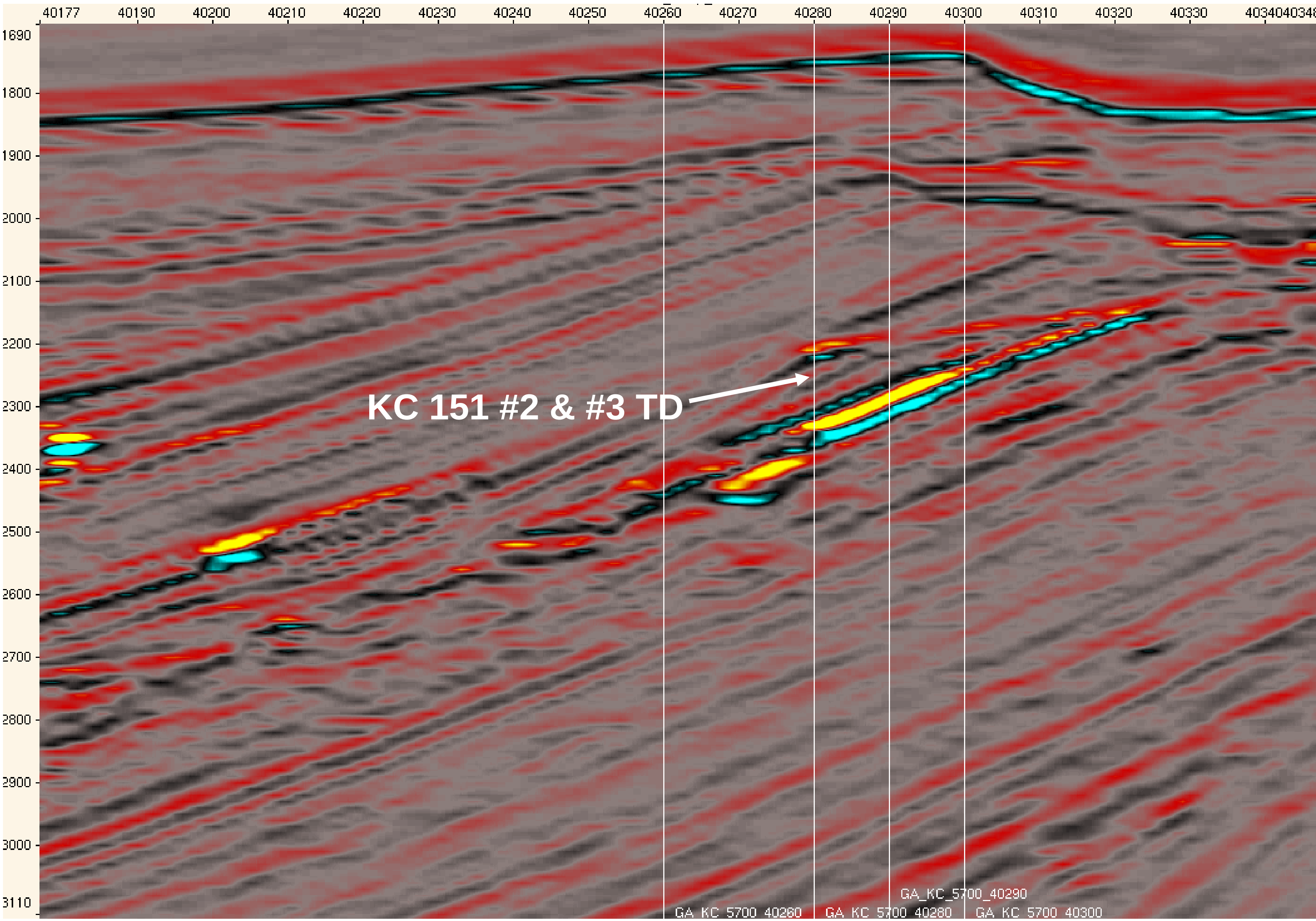
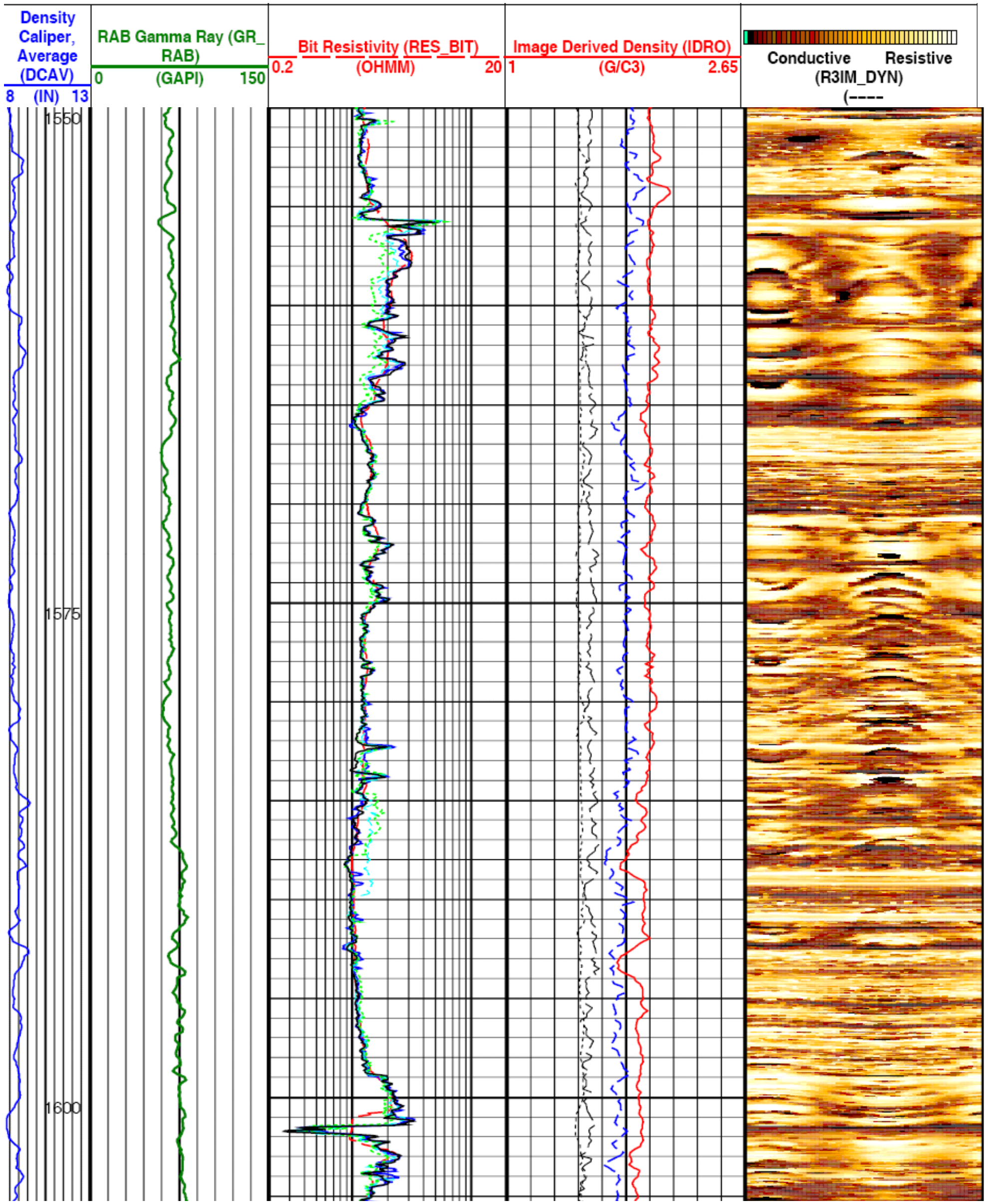
AT13#1
AT14#1

Keathley Canyon 151 #2 and #3



KC 151 #2 LWD Display - Hydrates



High Resistivity clay

Apparent Gas Hydrates

Note: Log depth scale is in meters

Holes Drilled / Footage

- Seven (7) wells, total of 5,540 ft drilled.
  - AT13 #1 – 809’ BML
  - AT14 #1 – 941’ BML
  - AT13 #2 – 656’ BML
  - ATM1 – 80’ BML
  - ATM2 – 103’ BML
  - KC151 #2 – 1506’ BML
  - KC151 #3 – 1445’ BML

Any questions?