NOAA Methane Hydrate Research

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NOAA Undersea Research Program

NAS Review of Hydrate R&D Activities
September 2003

About NOAA

(National Oceanic and Atmospheric Administration)

Department of Commerce

Mission: To promote job creation, economic growth, sustainable development, and improved living standards for all Americans, by working in partnership with business, universities, communities, and workers

NOAA's Mission

- To understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs.

Research conducted by NOAA

Four Mission Goals:

- Manage ocean resources
- Predict climate change
- Provide weather/water data
- Ensure safe, environmentally-sound commerce.

NOAA Research

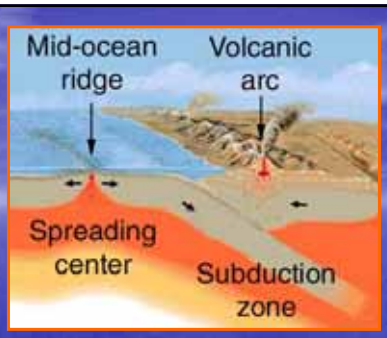
aka **OAR** (Oceanic and Atmospheric Research), one of six NOAA line offices

Mission:

- funds internal laboratories and
- extramural programs which use
- peer-reviewed process for selecting scientific research proposals;
- funds cutting edge research using advanced technologies; and
- produces high quality basic and applied scientific information.

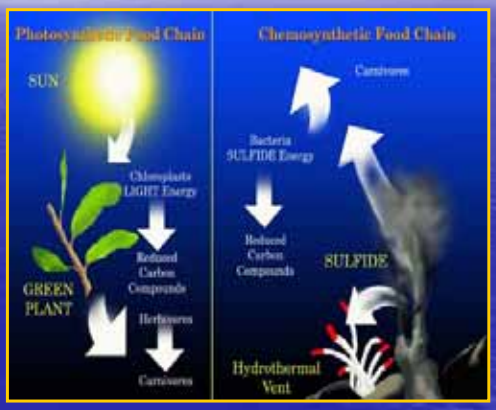
Vents and Seeps Research

- Undersea Research Program
- VENTS/Environmental Research Labs
- Ocean Exploration

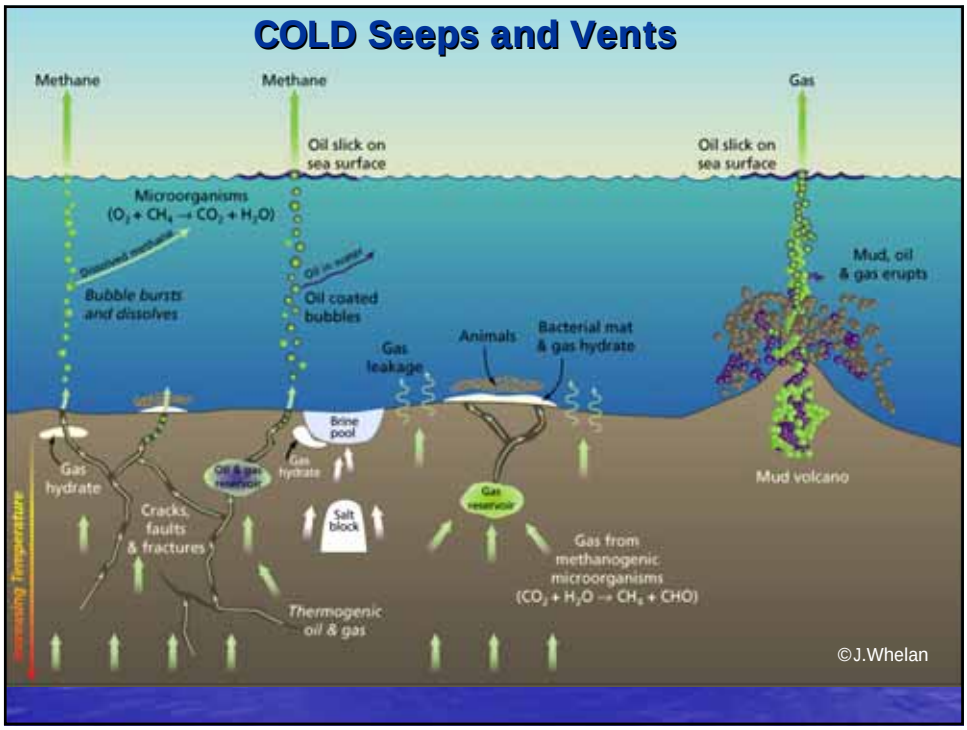


Why NOAA Studies Vents and Seeps?

- Marine ecosystems
- Climate change
- Seafloor stability and coastal hazards



COLD Seeps and Vents

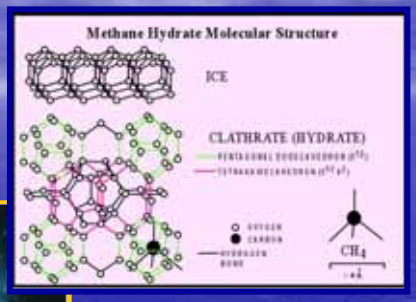


NOAA Interests in Gas Hydrates

- Resource characterization– where and how much?
- Production– impacts on associated ecological communities
- Global Carbon Cycle– amount and rate of flux (seafloor to atmosphere), climate implications
- Seafloor stability– impacts on in situ structures, coastal areas, and ocean habitats

Discoveries: Characterization

- NOAA/MMS Gulf of Mexico (GOM) 1990 to present (types and settings)
- NOAA Deep East 2001-03, Blake Ridge (flux indicators)



Exposed hydrate outcrop in Green Canyon, Gulf of Mexico. Photo from JSL sub. C. Fisher

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Discoveries: Ecology

- NOAA/MMS 1997-2000, GOM (iceworms)
- NOAA/NSF 1997-present, Oregon and CA (chemo community)
- NOAA/NSF 2001-2002, GOM (microbes)

Photomicrograph of iceworm, Hesiocaeca methanicola, discovered living in exposed hydrate bed in Gulf. C. Fisher.

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Eel River, CA, cold seep bacterial mat. Photo from ROV Ropos. L. Levin

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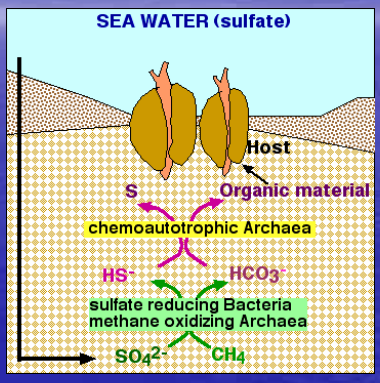
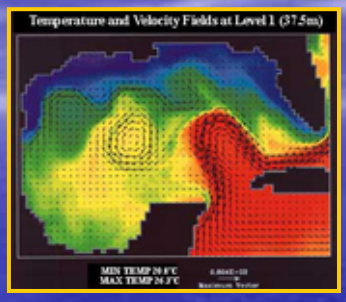
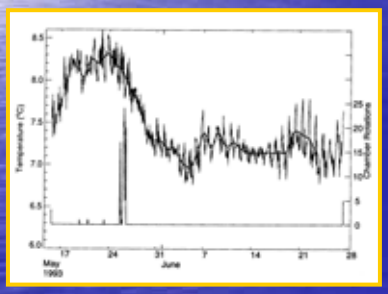


Discoveries: Climate

- NOAA/MMS 1990-1997, GOM (flux)
- NOAA 1990-2001, GOM (forams)





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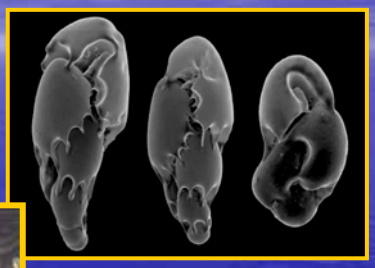
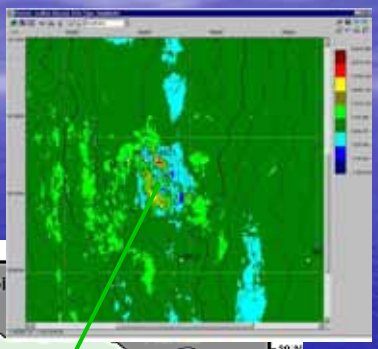
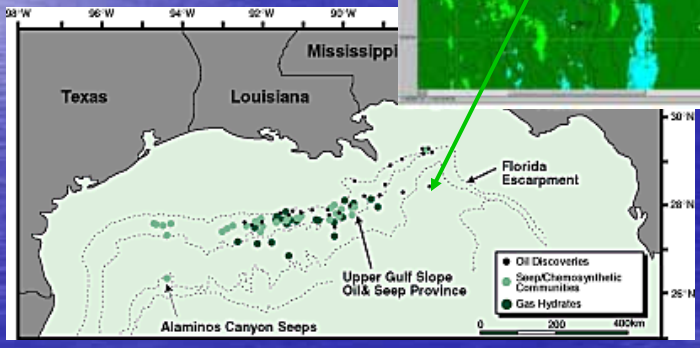


Discoveries: Seafloor Stability

- NOAA/Industry, Edge of the Gulf 2000 (3-d seismic in lease blocks)
- NOAA Deep East 2001-03, Blake R. & Hudson C. (ODP hole)





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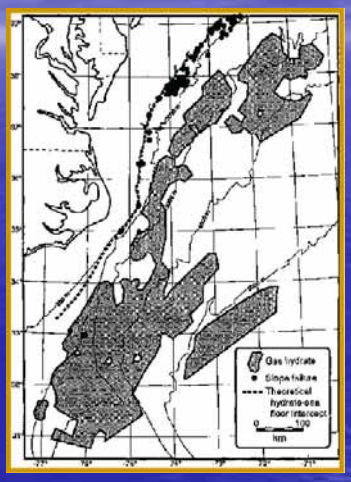
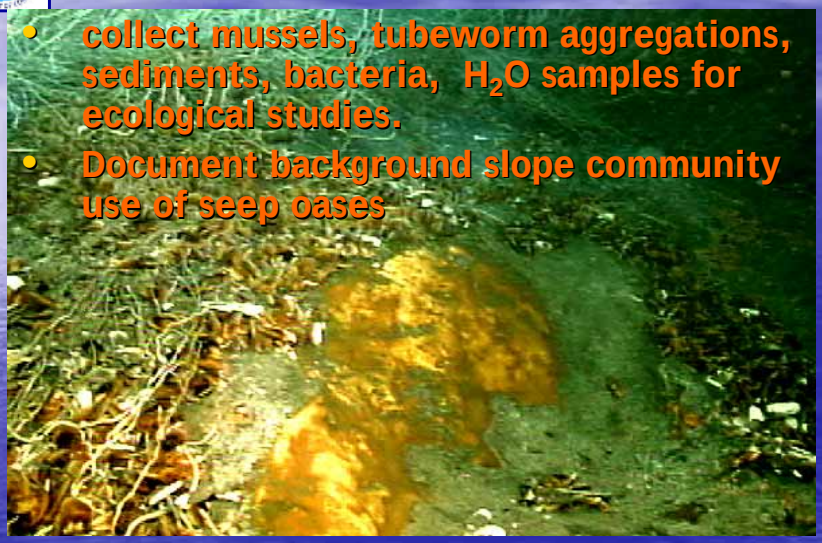


Technology Developments

- Bubbleometer
- Hydrate core
- High Resolution Digital imagery

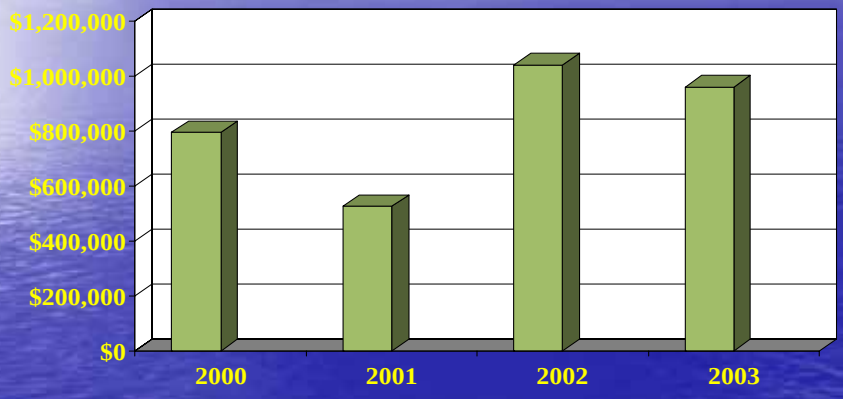
Alvin 2003--Gulf of Mexico

- collect mussels, tubeworm aggregations, sediments, bacteria, H_2O samples for ecological studies.
- Document background slope community use of seep oases

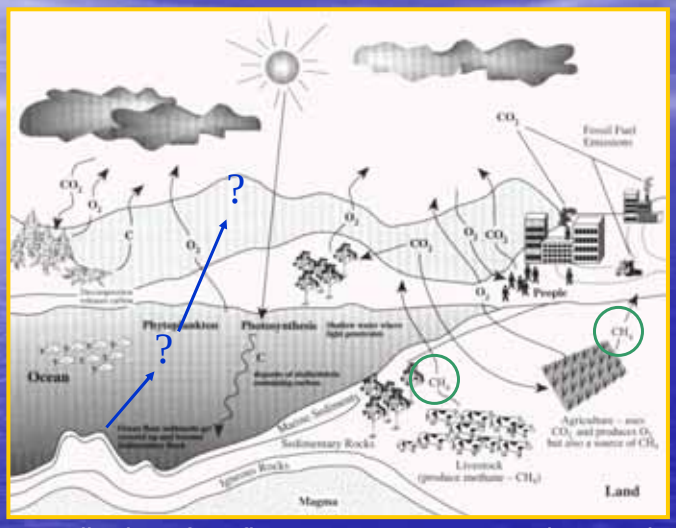


Tubeworms and mussels on yellowish hydrate mound.

NOAA Funding for Research related to Cold Seeps



Oceans and Climate



What is contribution of seafloor sources to ocean and atmospheric C and greenhouse gases, e.g., methane?

Future Research

- Continue studies of chemosynthetic communities living in and with hydrates
- Contribution of seafloor sources to ocean and atmospheric carbon and greenhouse gases?

Assess cold seep types and flux rates, and their role in the global carbon cycle, e.g.:

- How widespread are different types of cold seeps?
- What are methane gas discharge rates, to ocean and atmosphere?
- How does methane gas seepage vary over time?

- New technologies– gas hydrate observatory, mapping AUV (perhaps deep LEO-type station)