Gulf SERPENT: Exploring Life in the Mesopelagic and Bathypelagic Zones of the Gulf of Mexico Using Industrial ROVs

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SERPENT scientific and environmental rov partnership using existing industrial technology

MMS

SERPENT

- A global partnership
- Industrial ROVs and facilities for scientific research
- Time-available basis – no additional cost to industry

Value to Industry

- Reinforce the ‘E’ in the HSE message

Value to Industry (continued)

- Opportunity to showcase corporate commitment to the environment

Value to Industry (continued)

- Training for ROV pilots



Value to Academia

- Access to a limited resource – deep submergence ROVs

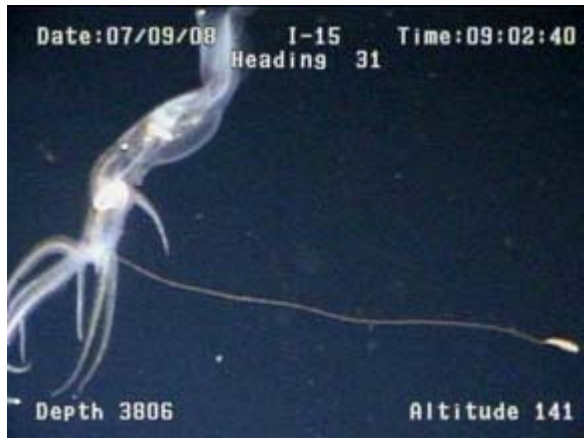
Value to Academia (continued)

- Access to the sea – deepwater sites for months to years



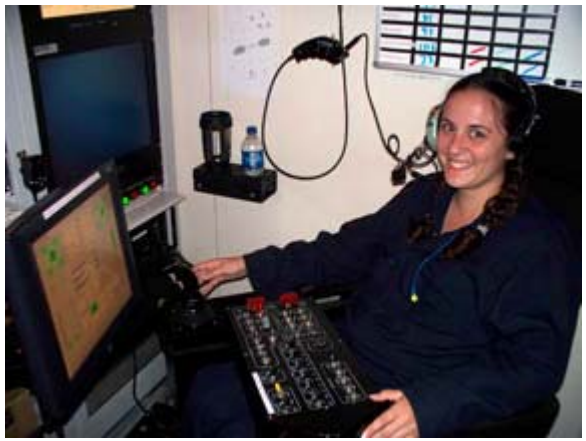
Value to Academia (continued)

- Scientific discovery



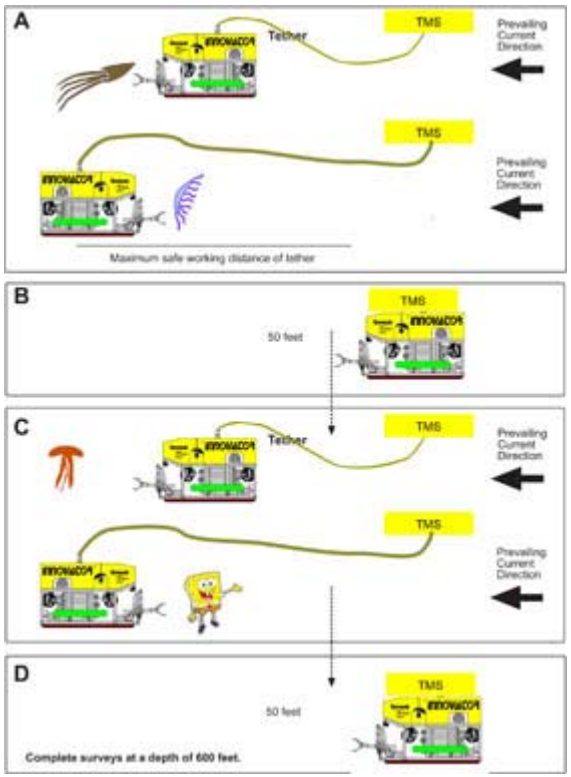
Value to Academia (continued)

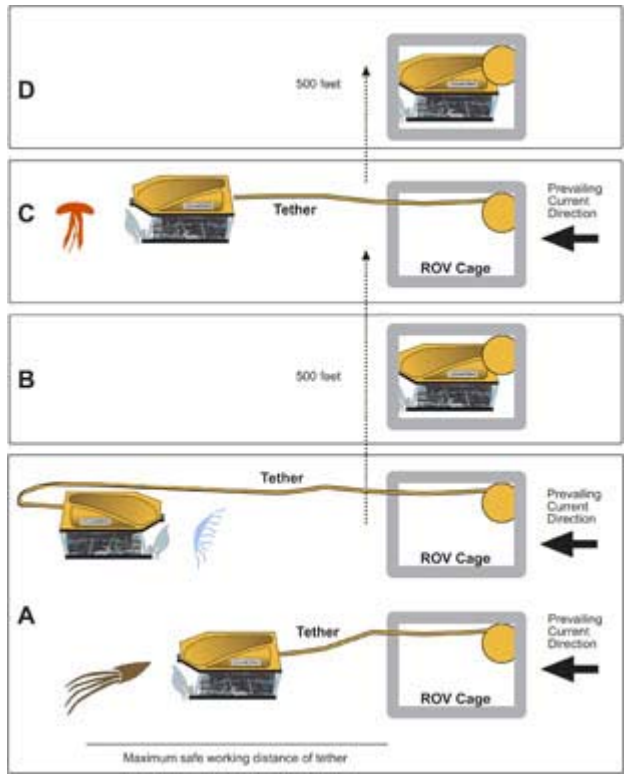
- Educational opportunities



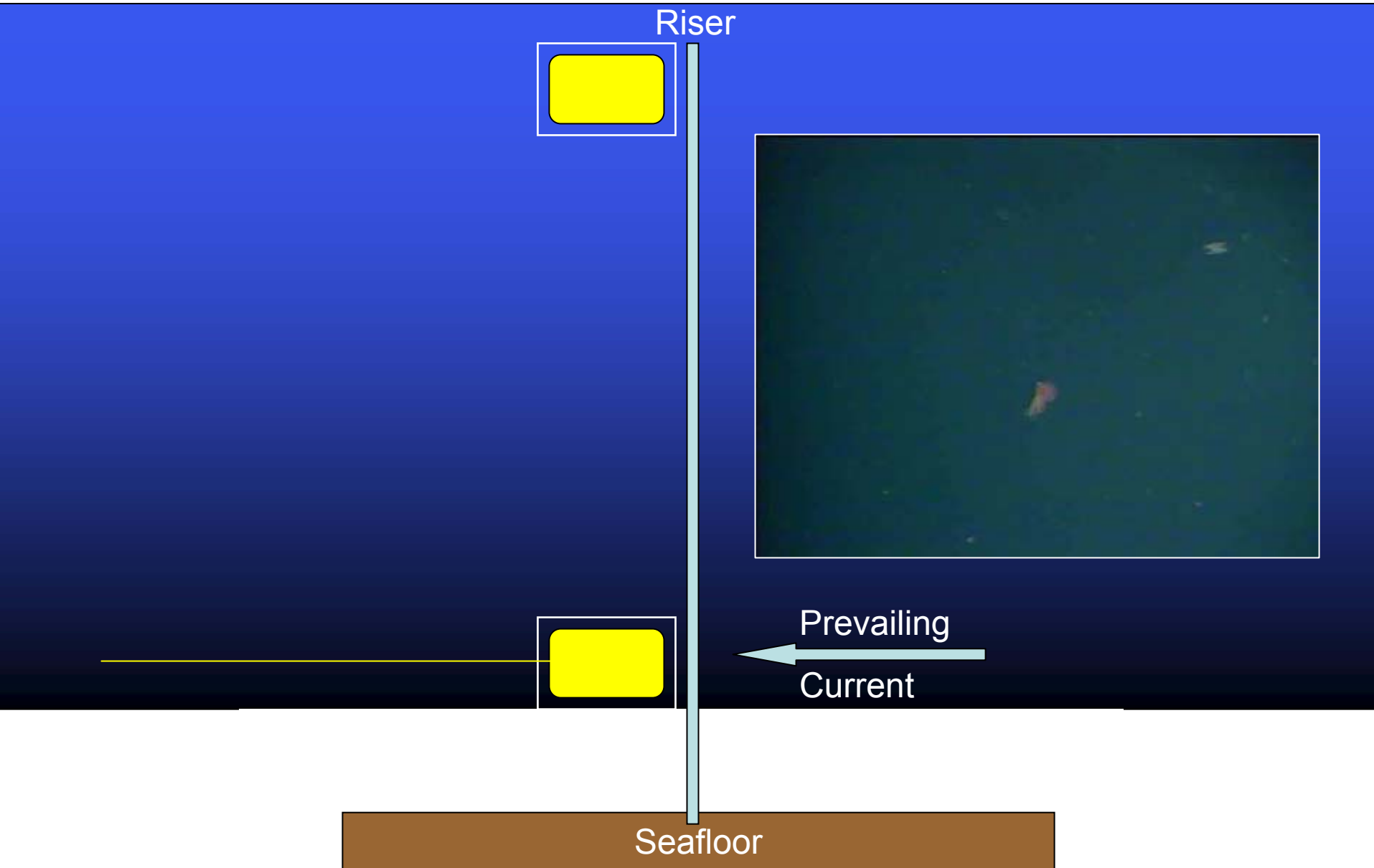
How Does it Work?

- Survey protocols developed in concert with ROV team





Surveys: Post-Riser Inspections



Dedicated Surveys

- Whenever a block of time is available
- Start near surface and work down or start at bottom and work up
- Temperature overlay at end of each horizontal transect

Dedicated Surveys (continued)

- Whenever a block of time is available
- Start near surface and work down or start at bottom and work up
- Temperature overlay at end of each horizontal transect

Opportunistic Observations

- Something interesting seen during the course of routine work
- Recorded for as long as safety and operations permit
- Some of our most interesting findings have come from such observations
- Includes retrospective data (what's on your hard-drive?)

Making it Work

- Survey protocols developed in concert with ROV team
- Periodic site visits to ensure that all personnel familiar with protocols
- Feedback
  - Monthly newsletter
  - Posters
  - Website
    - Currently http://zooplankton.lsu.edu/serpent.htm
    - In process of migrating site to www.serpentproject.com
- Regular participation in Oceaneering ROV Supervisor Training

Making it Work (continued)

SERPENT Research at Discoverer Enterprise

The SERPENT Project is a unique partnership between universities and the petroleum industry that uses your industrial remotely operated vehicles (ROVs) to study life in the deep sea.

It's a win-win situation. Oceanographers gain access to highly capable ROVs aboard stable facilities that remain in the same location for extended periods. This give us a chance to assemble a complete picture of marine life in the deepwater region of the Gulf of Mexico.

SERPENT demonstrates the industry's commitment to the environment. ROV pilots benefit from additional training opportunities. SERPENT finds are shared with the rig community to emphasize the unique marine community that exists below you. SERPENT only uses the ROVs when they are not tasked by drilling so there's no additional cost to the industry.

In the Gulf of Mexico, SERPENT research is coordinated by Louisiana State University. Our focus is on the animals that swim and drift through the deepwaters of the Gulf. With funding from MMS, our partnership with BP is establishing a network of oceanographic observatories beginning with Discoverer Enterprise, Mad Dog, and Thunder Horse PDQ.

How does it work? ROV teams conduct surveys for SERPENT when time permits. Videos are sent to LSU where organisms are identified. Expert marine biologists from around the world provide detailed identifications. Each observation is then entered into a database containing information about the date, time, location, depth, temperature, and behavior. Over time we will assemble a picture of where, when, and under what conditions each organism is found.

Meet Some Marine Life From Your Neighborhood ...

It's a strange world down below the ship. These animals have been observed during recent dives with the Millennium7 ROV.

Larvaceans These animals consist of a tadpole like organism that secretes a complex mucous 'house'. It filters water through the house and consumes what collects in it. When the house is clogged it abandons it. The abandoned houses (two right frames) are very fragile.

Ctenophores Also called comb-jellies, these fragile animals propel themselves using 8 bands of hairs that beat to produce a current. Most do not sting. Instead they capture food with sticky tentacles or swallow it whole. This one's called Bathocyroe (bath-oh-sir-row-ee).

Mystery Squid? Once in a while the ROV films something that leaves us perplexed. This may be some kind of squid. Whatever it is, it has two long tentacles, moves very quickly, and didn't hang around for long. We'll figure out what it is next time we see it!

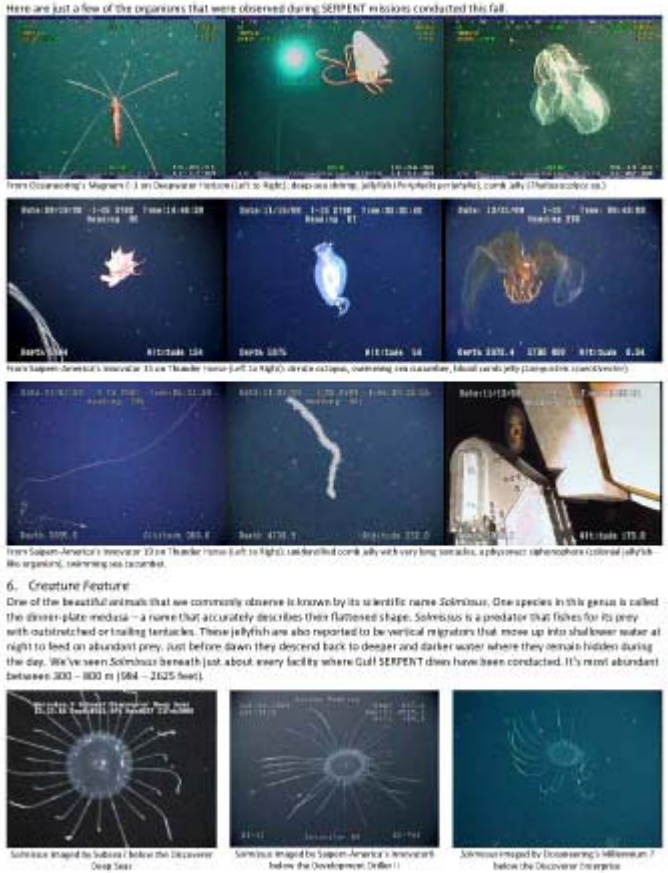
Illex This is probably the southern shortfin squid (Illex coindetii). They occur from the surface down to about 3000 feet. In other areas, similar squids are harvested for human consumption. These may be prey for larger fish and marine mammals.

Octopoteuthis This large squid who's name (pronounced oct-tow-poh-fy-this) is a midwater predator that feeds on fish and invertebrates. In turn, it likely is an important part of the diet of sperm whales. This one certainly wasn't camera-shy.

Sperm Whale Few people realize that about 1000 sperm whales inhabit the northcentral Gulf of Mexico. These large mammals spend their days diving into the deep to hunt squids and other organisms. This one was particularly interested in the ROV!

SERPENT bp OCEANEERING LSU MMS Transocean

Learn more about the SERPENT Project by visiting our website: www.serpentproject.com



Here are just a few of the organisms that were observed during SERPENT missions conducted this fall.

From Oceaneering's Magnum (1) on Deepwater Horizon (Left to Right): deep-sea shrimp, jellyfish (Periphylla periphylla), comb jelly (Thalassocalyce sp.)

From Saipem-America's Innovator 33 on Thunder Horse (Left to Right): shrimp, octopus, swimming sea cucumber, blood corals, jelly (Leuckartiara octona)

From Saipem-America's Innovator 33 on Thunder Horse (Left to Right): undescribed comb jelly with very long tentacles, a physonect siphonophore (colonial jelly fish-like organism), swimming sea cucumber.

6. Creature Feature

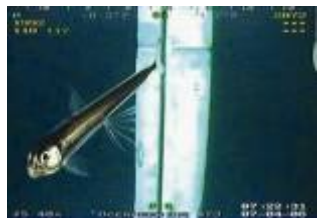
One of the beautiful animals that we commonly observe is known by its scientific name *Solmissus*. One species in this genus is called the dinner-plate medusa – a name that accurately describes their flattened shape. *Solmissus* is a predator that fishes for its prey with outstretched or trailing tentacles. These jellyfish are also reported to be vertical migrators that move up into shallower water at night to feed on abundant prey. Just before dawn they descend back to deeper and darker water where they remain hidden during the day. We've seen *Solmissus* beneath just about every facility where Gulf SERPENT dives have been conducted. It's most abundant between 300 – 800 m (984 – 2625 feet).

Solmissus imaged by Subsea 7 below the Discoverer Deep Seas

Solmissus imaged by Saipem-America's Innovator 6 below the Development Driller II

Solmissus imaged by Oceaneering's Millennium 7 below the Discoverer Enterprise

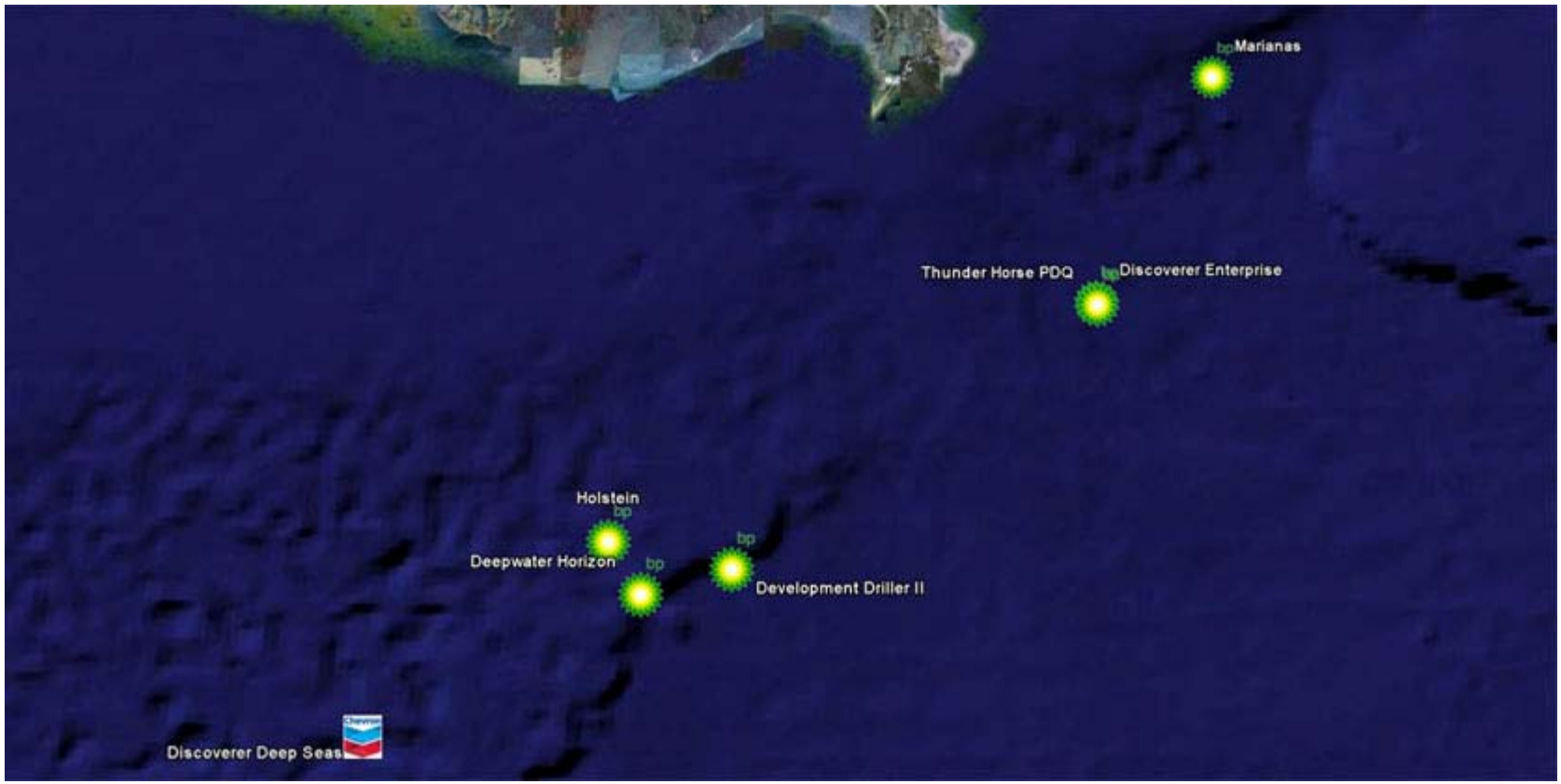
Operations



DATABASE
ID, Date, Time, Depth, Lat, Lon, Temperature, Other Metadata

Current Project Status

- Major partners: BP, Chevron, (Shell)



Current Project Status (continued)

- ROV Companies:
  - Oceaneering
  - Saipem-America
  - Subsea7
  - (Canyon Offshore)

Scientific Findings: Sleeper Shark

- Second *Somniosus* documented in Gulf of Mexico
- Published in Bulletin of Marine Science 2008

Scientific Findings: Manefish (*Paracaristius* sp.)

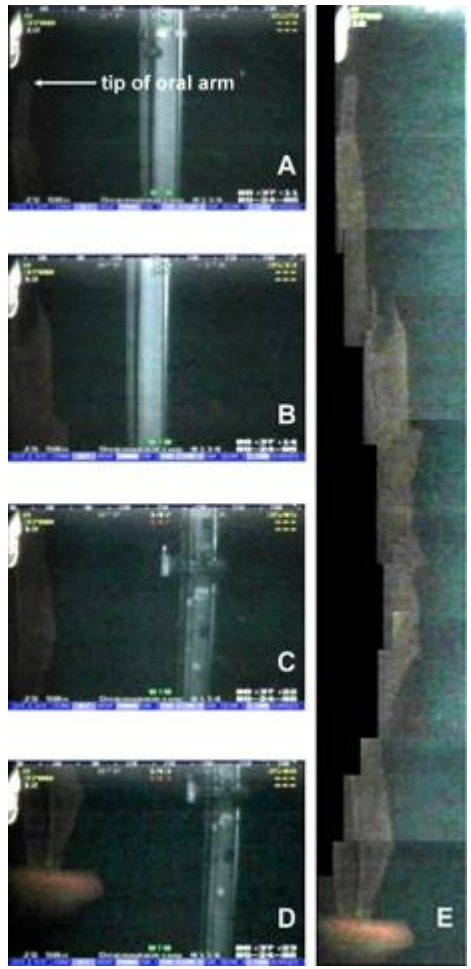
- Best video observations of this little-known species to date

Benfield et al.

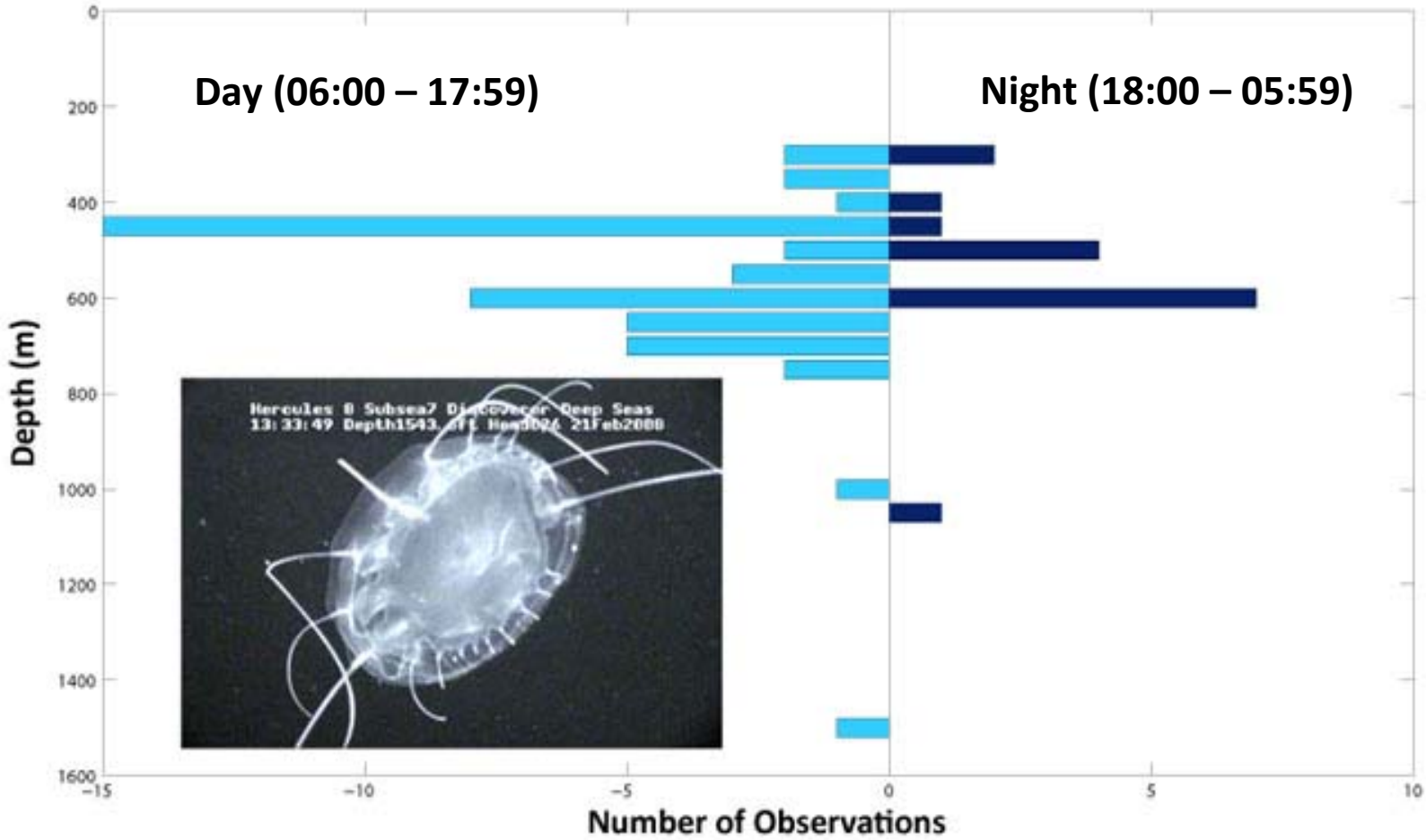
Image: NOAA

Scientific Findings: Stygiomedusa

- First records of *Stygiomedusa gigantea* from Gulf of Mexico
- Three observations: Discoverer Deep Seas, GSF Explorer, Thunder Horse

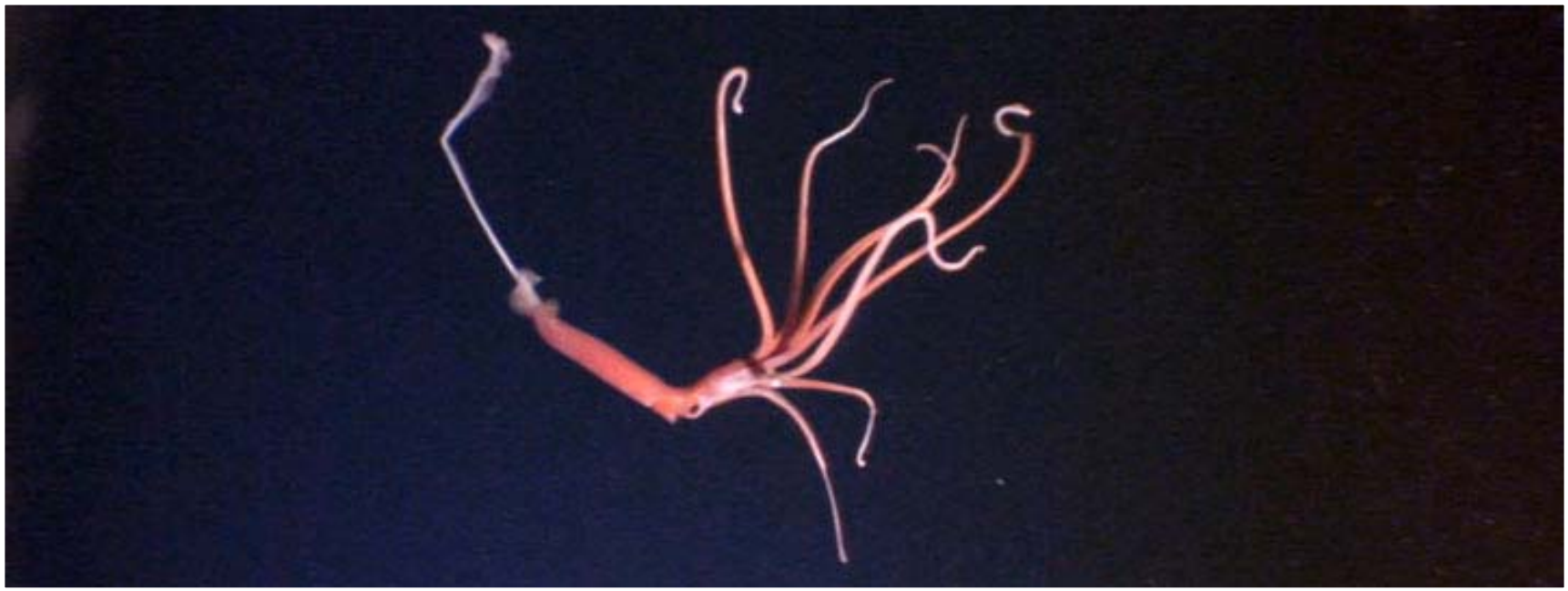


Long-Term Database



Future Outlook

- Current Partners: BP, Chevron, Shell
- High – definition cameras
- BP funded acquisition of an 8 megapixel camera system




DPC-8000 Camera Image from Marianas
OCEANEERING
Deepwater Technical Solutions

Acknowledgments

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- Oceaneering
- Saipem-America
- Subsea7
- SERPENT Project UK

www.serpentproject.com

Reference

Benfield, M.C., J.H. Caruso, and K.J. Sulak. Submitted. *In situ* video observations of two manefishes (Perciformes: Caristiidae) in the mesopelagic zone of the northern Gulf of Mexico. Copeia.