



### Purpose of the Dive

The objective of this work is to make a direct estimate of flux from a seep site by collecting a known volume of gas over a known duration of time. During EX1202L2 Dive 16 reconnaissance at the Pascagoula Dome, a relatively strong seep was observed. We returned to this site in order to assess the flow rate from this seep. The 'fill time' at this seep was anticipated to be ~10 minutes, significantly shorter than the fill time at seep 2 previously investigated at the Biloxi dome.

During EX1202 L2 Dive 16, a marker designated M-28 was dropped near the seep we wished to return to for the present dive.

### Description of the Dive:

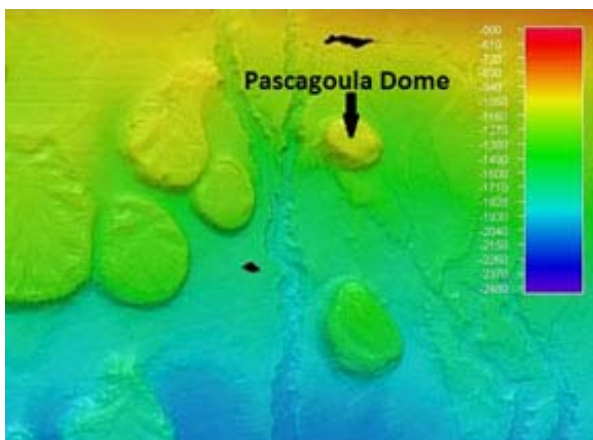
After waiting on weather until mid-afternoon, the decision was made to deploy the vehicles to a previously identified seep area along the southern flank of Pascagoula Dome. Evidence of gas bubbles in the water column had been observed during EX1105 and during EX1202-L1, and video confirmation of gas bubbles had been made on Dive 16 of the EX1202-L2. For Dive 04, Little Herc was modified with a gas collection cylinder. After sufficient time to flush the cylinder of air entrained during deployment, the valve at the top of the cylinder was closed for the duration of the dive.

After a routine descent to ~1119 m water depth, the vehicles began a search for the seep, which had been marked both electronically and with a seafloor marker with the number 28 on it. The seafloor was a complex mass of mussel and clam shells (some living patches, but many dead), scattered crabs and tubeworms, and carbonate hardgrounds. Living mussels were *Bathymodiolus childressi* and probably *B. brooksi*. After a search of more than an hour, during which a disseminated field (est. 1-2 m diameter) of escaping bubbles was observed and avoided, to keep the cylinder from filling prematurely, the marker was located and the bubble stream within ~5 m of the marker identified.

Prior to gas capture, video of the bubble stream was collected for ~ 5-10 minutes, with lasers illuminating the source to provide scale. Then, the cylinder was positioned over the stream for 7 min. 52 sec., a time sufficient to fill the cylinder with hydrate to an estimated capacity of between 10% and 20% of the cylinder's known volume. The vehicles then began a regular ascent, at 10 m./min. Slow changes in the shape of the hydrate ice plug were noted on ascent. A gas/water interface began to move downward within the cylinder, at first surrounding the hydrate, then as a simple fluid contact. At ~460 m, the ice plug fell from the lid of the cylinder to float on the gas-water interface, and began to sublime rapidly to gas.

The first vehicle stop was at 400 m. By this time, the remaining hydrate appeared to have turned completely back into gas. Subsequent stops at 350 m, 300, and finally 240 m were conducted to look at the increasing volume of gas with decreasing pressure, and note its level in the graduated cylinder. Then, the vehicles were returned to the surface.

Overall Map of ROV Dive Area



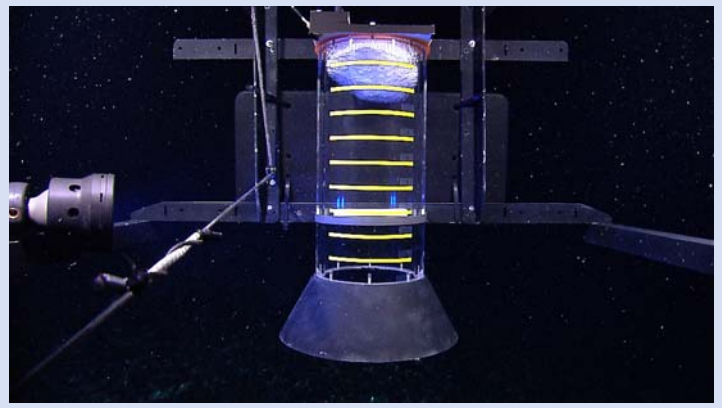
Close-up Map of Main Dive Site



### Representative Photos of the Dive



A view from the Seirios camera of Little Herc over top of an extensive bed of living and dead mussels where we were to conduct the gas capture experiment.



A mass of methane hydrate quickly formed in the top of the collection bucket while capturing a continuous stream of methane bubbles rising out of the extensive mussel bed. This version of the methane bucket was modified from the previous version to prevent leakage out of the top valve.

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