The 1927 Mississippi River flood was one of the most destructive in recorded history. Flooding produced 127 levee breaches along the Mississippi River (nation-wide) with 42 of these classed as major breaks. The only major levee break in Mississippi was at Mounds Landing in southern Bolivar County. This break (also referred to as a crevasse) flooded Greenville, Scott, and several other Delta communities. The crevasse resulted in flooding of 162,017 homes, with 41,487 of these considered total losses. Crop losses were estimated at $102,562,395 and 325,554 people required some sort of relief care.

By any measure the 1927 Mounds Crevasse was a major disaster for Mississippi. Formation of the crevasse itself was somewhat unique as people on the levee witnessed the event, so we have accounts of what occurred. Based on eyewitness accounts, it appears that the levee may have failed rather than being overtopped. In the case of a failure, there may be underlying geological reasons that remain today that pose safety concerns for the modern levee. The purpose of this study is to investigate the genesis of the 1927 Mounds Crevasse with emphasis on the geology underlying the levee, and the goal of identifying any geological concerns that may exist. If concerns are identified, then similar conditions at other sections of the levee may suggest the need for additional investigations.

Subsurface data provided by the U.S. Army Corps of Engineers’ Vicksburg District Office are being processed to produce a set of cross sections across the crevasse. Additional data relevant to the crevasse will be gathered from sources in Greenville as well as other areas of the Delta.

CRUISE ACTIVITIES:
ANTIQUE SHIPWRECK SURVEYORS EMPLOY NIUST AND CMRET EXPERTISE

In October the NOAA ship, R/V Nancy Foster came to the Gulf and Consortium members were able to participate in several capacities. Andy Gossett and Matt Lowe, the launch and recovery team for the National Institute for Undersea Science and Technology’s (NIUST) Autonomous Underwater Vehicle (AUV), Eagle Ray, guided the mini-sub through its missions on the first part of this cruise, October 5-11. The second leg, October 13-21 was an engineering cruise for the newest member of the NIUST AUV fleet, Mola Mola, a photo-AUV. Mola Mola performed extremely well; however navigation particulars must be resolved before the AUV can be considered fully functional. Visiting CMRET scholar, Mariangela Lodi performed the data processing for both legs of the cruise.

Andy Gossett and Larry Overstreet, together with Scott Sharpe, Specialty Devices, Inc. (SDI, partners in technological development of many components of the Seafloor Observatory), cruised to MC118, October 20-22, to reconfigure the Integrated Data Power unit (IDP) and to download updates. Following the successful download, all IDP communications ceased. After many hours of unsuccessful attempts to remedy the situation, it
was decided to return to port. A second trip went out October 28-30 during which Andy, Larry, Scott, Matt Lowe and Brian Noakes successfully recovered the IDP and Scott returned with it to SDI. It has been evaluated and the software incompatibility corrected. Redeployment of the IDP is an objective of the April cruise. A rotary camera was also recovered during this cruise.


The Consortium’s fall meeting was held November 5-6 in Columbia, SC, with the University of South Carolina hosting the event. This very successful meeting was attended by more than 40 hydrates researchers and representatives of the three federal agencies that fund the Consortium's research. Columbia was a very popular venue and the group was enthusiastically received by the Department of Earth and Ocean Sciences at the University of South Carolina. The Consortium meeting Proceedings are available online.

On November 13, the CMRET/STRC had a site visit from Senator Wicker's staff. This visit went extremely well and we have had requests for follow-up visits from several University departments, resulting from the interest generated from this visit at the congressional delegation reception which followed the campus site visits.

STUDENT PROJECTS AT MMRI

A responsibility of the MMRI is to provide students with "real world" working experiences while pursuing their degrees. Projects are identified and defined by the student, but are completed with the oversight of the MMRI professional staff. The undergraduate student projects summarized below are part of the MMRI’s Energy Program and are under the supervision of Jeremy Dew and Charles Swann.

Chap Brackett, an undergraduate from Savannah, Georgia, pursuing a Bachelor of Science degree in Geological Engineering from the Department of Geology and Geological Engineering, furthers MMRI’s mission by inputting well-log data into the Ridgway Data Center's ever-expanding collection of well logs and well information. Chap has chosen a project that will utilize his experience with the resources of the Ridgway Center; he will investigate a small, hydrocarbon-producing field in Mississippi and summarze the geological data, make interpretations of these data and assess the potential of the field. The completed dataset will become a publicly available component of the Data Center. Ideally, a publication will result from the project.

A.J. Gibson is an undergraduate from Union City, Tennessee who helps scan well logs for the Ridgway Center. He is pursuing a geological engineering degree from the Department of Geology and Geological Engineering. While working with the Ridgway Center's well logs, A.J. developed an interest in structure and its implication for potential hydrocarbon accumulations. He chose his project in northern Mississippi with the goal of identifying faulting and other structures which have been cited in the public literature. The result of his project will be a structure map and his interpretation of its significance. A publication is an expected product of A.J.’s investigation.
Calendar year 2009 closed with a flurry of interest and activity in the alternative energy arena. MMRI was called upon to work with private industry in several capacities, mainly to develop and test the feasibility of community and industry plans to become involved in the realm of alternative energy. Troubles that plagued first generation alternative fuels have redirected approaches to economic renewable energy. The main focus areas are now Biomass Gasification for the production of electricity and waste-water treatment facilities’ challenges deriving from increasing amounts of fats, oils, and grease (FOG) in waste-water. Biomass encompasses almost any carbon-based material, the most common being woody materials. Woody materials can be run through a process known as Gasification which yields a gas one eighth the BTU value of pipeline natural gas. Waste-water treatment facilities face costly downtime and maintenance deriving from buildup of FOG in their equipment.

Electricity – a convenience many of us take for granted - is becoming more and more costly, both monetarily and environmentally. It is a perfect fit for renewable resources since a distribution network is already in place and dedicated machinery can be custom-built to generate power directly into the existing grid. Problems of finished product transport and engine malfunctions happening at the end-user do not exist. As long as power is fed into the grid in proper synchronization, the end-user will notice no difference in using renewable-generated electricity. Hurdles to production reside in negotiating the different components of this type of project from equipment design and manufacture, location selection, and power purchase agreements with utility providers. MMRI’s Brad Crafton is currently working through these developmental phases with the cooperation of other University researchers, county government, and private industry to see this new technology to fruition.

In all waste-water treatment facilities, FOG quickly becomes an impediment to production. This nuisance can be turned from a cost center into a revenue stream with some creative problem-solving and engineering. One way to mitigate this difficulty is through Dissolved Air Flotation (DAF). The waste-water is taken through a DAF tank where the bulk of the FOG is harvested and sent to aerobic digesters. The only issue with this method is that the FOG flow quickly exceeds the digesters’ throughput capacity. Crafton is working with several groups to take the FOG and use it to produce electricity for onsite use by the plant rather than just digesting it. This is an attractive alternative due to the large amount of power needed to run all the pumping equipment.

There will be many applications for both of these technologies after they have been proven. Neither is new, but our planned applications are in areas previously ignored. We foresee working with at least three facilities with new applications in 2010.

**GEOLOGICAL MAP FOR THE OXFORD, SOUTH QUADRANGLE COMPLETED**

In the last MMRI Newsletter we announced that the geological map for the Oxford South topographic quadrangle was under revision. We are pleased to report that the additions and revisions have been completed and the revised map should be available through the Institute's website in early 2010. The revised map includes more detail regarding the loess outliers on the Tallahatchie / Yocona River divide and a newly recognized erosional high along the Hatchetigbee / Meridian Sand contact. The University of Mississippi main campus and a large portion of the City of Oxford reside within the perimeter of this quadrangle. More information on the MMRI geological mapping program is available on our web site.

**EXPLORING SICILY’S SEAFLOOR, PAYING TRIBUTE TO THE MEMORY OF FORMER MMRI-CMRET DIRECTOR JAMES ROBERT (BOB) WOOLSEY, JR.**

James Robert (Bob) Woolsey Jr., long time Director of MMRI-CMRET (1982-2009), was an internationally renowned marine geologist and ocean scientist. His research spanned the globe from marine mineral resources assessment offshore North America, South America, southeast Asia and Africa, to marine gas hydrates in the Gulf of Mexico and volcanic submarine land slide and
tsunami risk hazard in the Mediterranean Sea. Dr. Woolsey was fascinated by the complicated geological setting of the Sicilian offshore, especially by the presence of multiple active volcanoes (Stromboli, Vulcano and Etna), a high-risk earthquake zone (Messina Strait) and quite recent submarine landslides (Ischia and Stromboli Island). Since 2005, Dr. Woolsey and MMRI had become very active in cooperating with the University of Rome La Sapienza (the Italian institute leading the research effort) conducting international research cruises to investigate these phenomena. A Memorandum of Understanding between the two Academic Institutes was signed to exchange technology and expertise. From that time, Dr. Woolsey and MMRI researchers and Technicians participated in three research cruises in the Sicilian sea, on which the University of Mississippi hosted five graduate students from "La Sapienza", training them in cutting-edge techniques of ocean exploration and seafloor mapping. The passion with which Dr. Woolsey advised the students, his extraordinary scientific outlook and, overall, his natural southern gentlemanly behavior, conquered the Italian colleagues. They were deeply saddened when the news of Dr. Woolsey's sudden death crossed the Atlantic, partly because in a few months they were expecting him for the final research cruise in Messina Strait. That cruise would finalize the 3 years' research focused on investigating and understanding the causes of the 1908 Earthquake and Tsunami that had struck the cities of Messina and Reggio Calabria causing over 60,000 casualties.

For this reason, when in November 2009 the Italian Research Vessel Urania left the Messina dock to accomplish this mission, the cruise was named "Bob 09". Dr. Leonardo Macelloni, Research Assistant Professor, and Dr. Woolsey's daughter, Emily, a senior geological engineering student at the University of Mississippi, joined the cruise on behalf of MMRI and CMRET.

The MMRI/CMRET participants helped the Italian participants in processing swath bathymetry data to map areas of the Messina Strait where multiple submarine landslides have occurred over the last few years (the last just weeks before the cruise accounted for the deaths of 20 people). They also, using the CMRET's long experience in high resolution digital seismic processing, improved the quality of the seismic records collected onboard.

Relevant results of the cruise include: individualization and detail of submarine mud volcanoes never before known, and the delineation of several very shallow submarine sedimentary bodies that show high potential of failure and slide.