Advanced Offshore Measurements to Support Wind Energy Production, Weather Forecasting, and Emergency Response

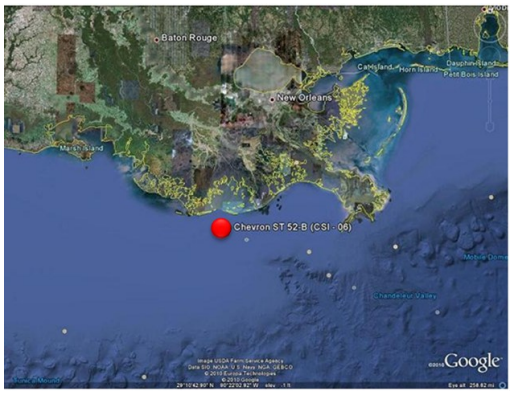
Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

radiometrics

Sonoma Technology, Inc. (STI), with support from the Bureau of Ocean Energy Management, is leading a unique partnership of corporate, government, and university researchers to develop a marine environmental observations program in the Gulf of Mexico. The primary goal of this project is to develop a framework of advanced offshore measurements to support emergency response, oil and gas exploration and lease decisions, wind energy research and development, and meteorological and air quality forecasting.

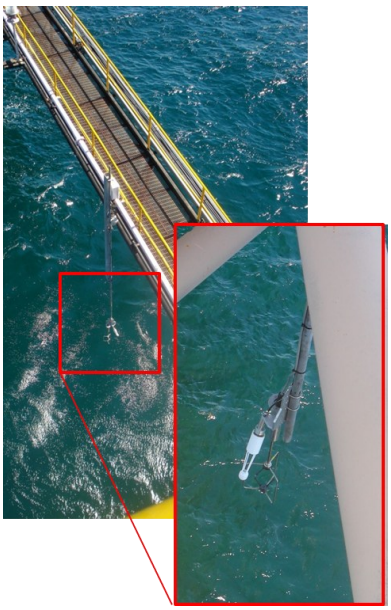
STI team members unloading equipment onto the platform.

The measurement program, which began in October 2010, includes advanced *in situ* and remote meteorological and oceanographic sensors. The sensors are deployed on a Chevron platform to collect boundary layer and sea surface data sufficient to support these applications.

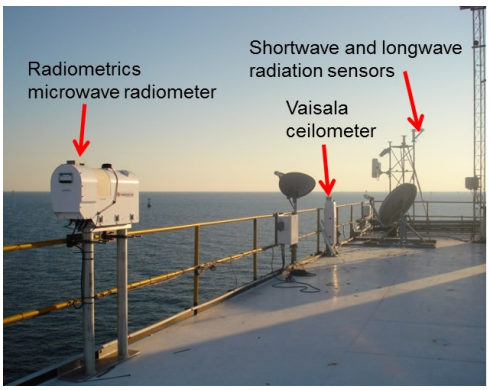


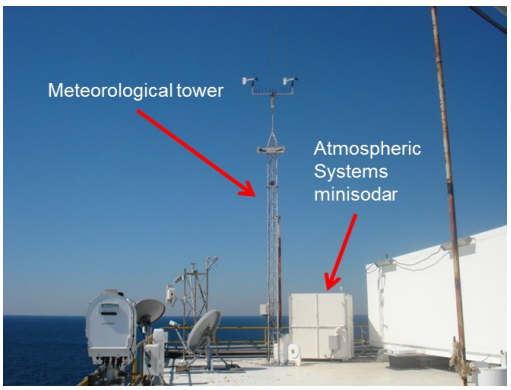
The site is located 12 miles offshore and 78 miles south-southwest of New Orleans.

Observations include measurements of boundary layer winds using Atmospheric Systems' 4000 Series minisodar; profiles of temperature, relative humidity, and liquid water from Radiometrics' MP3000 microwave radiometer; cloud base heights and boundary layer heights collected using Vaisala's CL-31 ceilometer; sea surface temperature; wave height and frequency; solar and infrared radiation; and turbulent momentum and heat fluxes. This project has resulted in the collection of unprecedented measurements over the Gulf of Mexico that captures a range of meteorological and oceanographic interactions for all seasons.



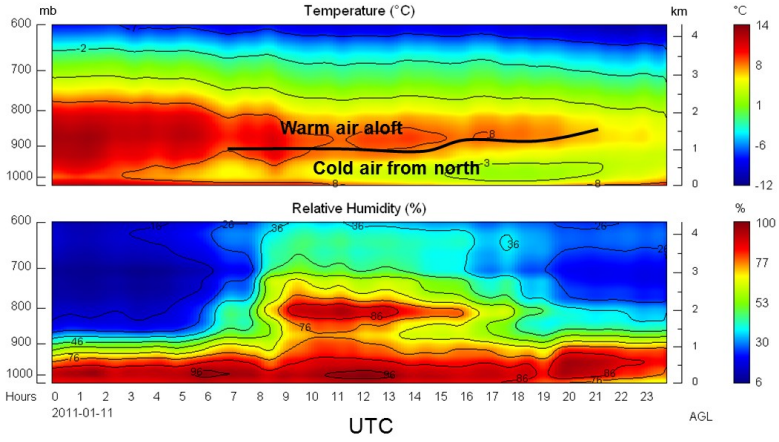
Above: Flux sensors that characterize air-sea energy exchange.





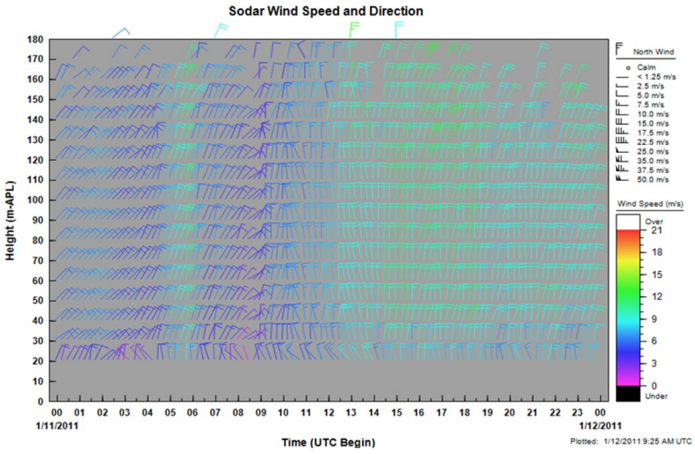
Operating for over 15 months, Radiometrics' microwave radiometer has been providing continuous atmospheric profiles. In conjunction with the other measurements, data from the radiometer are being used to characterize and understand boundary layer processes over the Gulf. In the data example below right, the top of the boundary layer is evident on January 11, 2011, at the interface between the cold continental air as it moved over the Gulf and the warm marine air above.

Left: Atmospheric Systems' minisodar noise abatement blanket used to improve data recovery by mitigating platform noise.

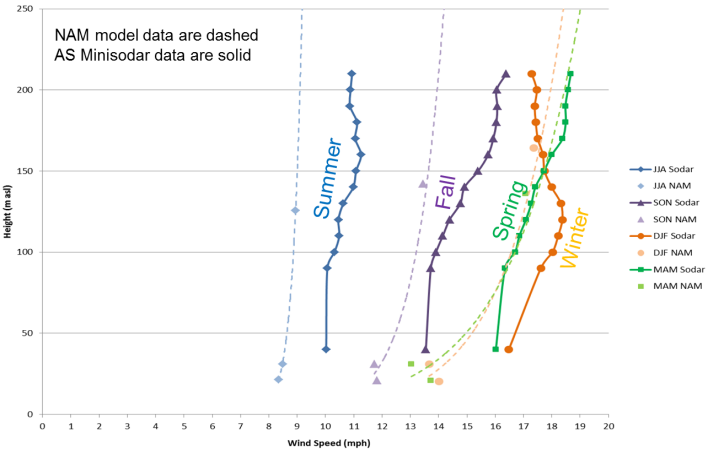


Radiometrics microwave radiometer data showing vertical structure of the boundary layer.

Atmospheric Systems' minisodar was customized to withstand the harsh marine environment for a long period with virtually no maintenance or downtime. Its physical and electronic systems eliminate substantial platform acoustic noise that would normally interfere with the measurements. The system is allowing us to collect high-resolution boundary layer wind data at the heights needed to evaluate wind energy production and boundary layer processes that influence winds over the ocean. Examples of the minisodar data and how the data could be used to evaluate wind energy potential are shown below.



Example of excellent data recovery for the Atmospheric Systems' minisodar from ~60 to 200 m above mean sea level.



Seasonal average minisodar wind profiles compared to model predictions of winds. Measured winds in the lowest 200 m show higher wind speeds and more vertical structure compared to the North American Mesoscale (NAM) model.

This study is being led by Sonoma Technology, Inc. with significant participation from project partners including Louisiana State University, University of Colorado, National Oceanic and Atmospheric Administration, and the Bureau of Ocean Energy Management.

STI appreciates the support of the U.S. Department of the Interior, Bureau of Ocean Energy Management, and the Gulf of Mexico OCS Region during the field program.

The opinions expressed here do not necessarily reflect the opinion or policy of the U.S. Government.

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