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TI: Results from a Real-time Environmental Ocean Observing System on a Wind Farm Platform in the Texas Hypoxic Zone
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AB: In the summer of 2009, a multi-disciplinary system, the Galveston Instrument Garden for Environmental Monitoring (GIGEM), was deployed off the coast of Galveston, Texas (Location: 29°08’29.654”N, 094°44’51.339”W). GIGEM was specifically designed to monitor coastal waters near the Brazos River discharge and to provide real-time observations examining processes responsible for Texas hypoxia. Hypoxia commonly occurs over Gulf of Mexico continental shelf and refers to low dissolved oxygen concentrations (less than 1.4 ml·l⁻¹, equivalently 2.0 mg·l⁻¹) in the bottom waters caused by a combination of environmental and physical parameters. Events along the Texas shelf form rapidly, last for a few days to weeks, and commonly occur along the Texas and Louisiana coasts. The Louisiana hypoxic zone has been studied extensively however; little research has been conducted to understand the formation and duration of isolated Texas hypoxic events. GIGEM was designed for this problem by contributing real-time measurements to compare with historical coastal data series. This ocean observing system (OOS) is comprised of two components, the subsurface mooring and a nearby bottom package, and the data telemetry system includes a unique system of underwater and surface inductive
modems. Unlike most coastal OOS, GIGEM is installed on the first executed experimental wind farm platform in the United States operated by Wind Energy System Technologies, Inc. Currently, GIGEM is the only coastal OOS collecting real-time environmental water quality measurements on the Texas shelf. Since deployment, three independent, non-summer hypoxic events have been measured by the system and attributed to vertical stratification from freshwater influx due to persistent low-pressure atmospheric systems over Texas. The physical processes influencing vertical stratification, nutrient profiles, and water quality data for each event will be discussed. Conclusions from these events will also be compared with historical statistical analyses to determine the temporal and spatial characteristics of Texas hypoxia and the possibility of defining Texas hypoxic potential and forecasting conditions for future events. Finally, the capabilities of GIGEM system to fulfill societal goals for protecting coastal ecosystems, to improve coastal weather and ocean predictions, and to aid in environmental monitoring as envisioned by the Integrated Ocean Observing Systems (IOOS) will be discussed.

DE: [4262] OCEANOGRAPHY: GENERAL / Ocean observing systems
DE: [4500] OCEANOGRAPHY: PHYSICAL
DE: [4546] OCEANOGRAPHY: PHYSICAL / Nearshore processes
DE: [4834] OCEANOGRAPHY: BIOLOGICAL AND CHEMICAL / Hypoxic environments
SC: Interdisciplinary (IT)
MN: 2010 Ocean Sciences Meeting