Be^7 inventories as tracer for sediment movements on the inner shelf: western Atchafalaya River Delta, Louisiana, USA (poster presentation)

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Recent studies of many major fluvial-marine dispersal systems have identified the importance of high-density sediment suspensions (fluid muds) in cross-shelf transport of sediment, and resulting lithofacies distributions. We have undertaken seabed studies on the inner shelf west of the Atchafalaya River Delta to elucidate controls of cold-front passages and seasonal supply of river sediment on formation, deposition, and physical properties of muddy seabed. Sediment boxcores were collected during cruises in February, March, and April 2007 and

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2008, coordinated with time-series hydrodynamic observations and coinciding with peak river discharge and the occurrence of ~weekly cold fronts that occur in winter and spring. Cores were taken along repeat transects perpendicular to the shoreline and subsampled for X-radiography, and measurements of grain size, water content, and Be^7 (half life 53.3d), a cosmogenic particle reactive radioisotope that can be used as a tracer of fluvially derived sediments in coastal-marine settings.

Measurable Be^7 activities were generally confined to physically stratified surficial sediments (the upper ~2–6 cm of the seabed) with high water content (porosity > 80%), indicating that these sediments were recently deposited and/or remobilized by waves and currents. Changes in spatial distributions of Be^7 inventories between cruises demonstrate that this high-porosity sediment layer (representing 7–20 kg of dry sediment per square meter of seabed) is highly mobile over monthly timescales, in response to wind-wave re-suspension and transport associated with cold fronts. Patterns of Be^7 inventories suggest that sediment is first delivered from fluvial sources to the east following peak river flow in early spring, and then deposited across a wide region extending 10–15 km from the shore. Subsequent sediment re-suspension and shoreward transport in the bottom boundary layer (associated with cold front passage) results in occurrence of high Be^7 inventories within 5–10 km of shore, landward of the 10 m isobath.

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