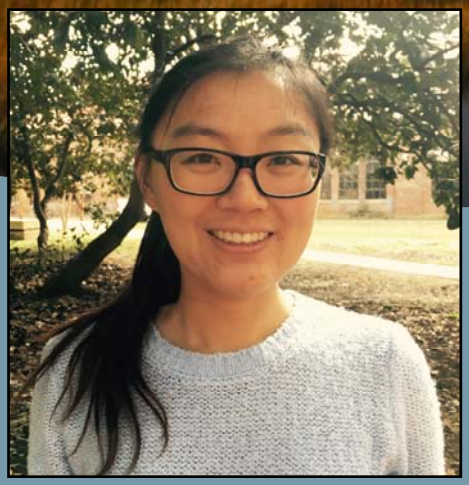
The Coastal Waters Consortium Presents:

Project Spotlight



LinLin Cui

Ph.D. Student
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What is the topic of your research within the CWC?

My research focuses on studying the impacts of Mississippi River diversions on oil transport, salinity gradients, and residence times in the Barataria Bay. With the GoMRI-CWC funding, we have implemented a high resolution 3-D Finite Volume Coastal Ocean Model (FVCOM).

What methods are you using to answer your questions?

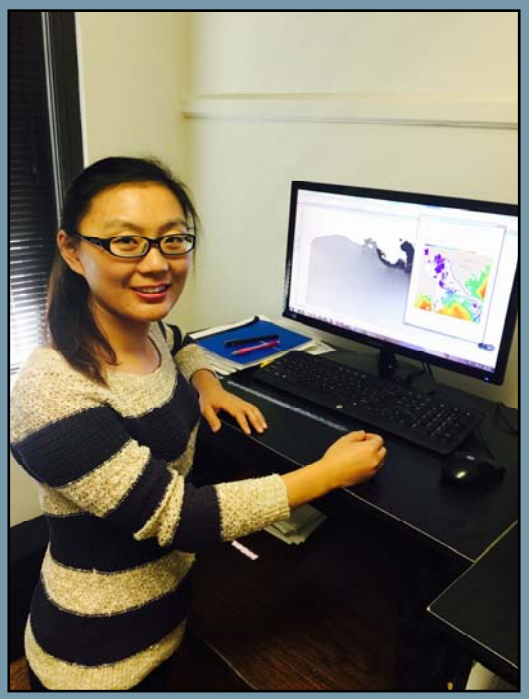
A high resolution 3-D FVCOM used in my research covered most of the Alabama-Mississippi-Louisiana-Texas continental shelf, and extended to Barataria Basin. The model's horizontal resolution ranges from ~10 m (Barataria Bay) to 5 km (Northern Gulf of Mexico), such that small scale features, for example, bayous, barrier islands, navigation channels, and marsh island, can be well represented.

What results have you gotten thus far?

Our results indicated that Davis Pond diversion can decrease the salinity in the lower Barataria Bay by 2 ppt. When both Davis Pond diversion and proposed Mid-Barataria sediment diversion were opened to their maximum capacity, salinity in the lower Barataria Bay decreased by 5 ppt. Residence times decreased from 27 days to 2 days in the major waterways, while they decreased between 10% and 40% at wetland sites.

Did any of these results surprise you?

What surprised me is that salinity decrease dominantly appeared around the Barataria Pass, which is a tidal inlet accounting for the main exchange between the continental shelf and the estuary. There are no apparent salinity variations over most of the wetlands, even around the diversions. Without performing numerical calculation, these consequences are not easily comprehensible.



What are the next steps in your research?

I will investigate which factor(s) contributes to salinity variations and flux exchanges between the estuary and the continental shelf, such as Ekman transport, winter cold frontal events, and river discharge.

What are the "big picture" implications of your study?

The model and its simulation results will provide policy-makers and resource managers an important management tool to operate the diversions, including the optimal time to open diversions and optimal volume of water. This high resolution hydrodynamic model can also be used to predict oil slick transport trajectories during any possible future oil spill accidents.

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