



Sensitivity of Hypoxia Predictions for the Northern Gulf of Mexico to Sediment Oxygen Consumption and Model Nesting

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Interannual variations of the hypoxic area that develops every summer over the Texas-Louisiana Shelf are large. The 2008 Action Plan put forth by an alliance of multiple state and federal agencies and tribes calls for a decrease of the hypoxic area through nutrient management in the watershed. Realistic models help build mechanistic understanding of the processes underlying hypoxia formation and are thus indispensable for devising efficient nutrient reduction strategies. Here we present such a model, evaluate its hypoxia predictions against monitoring observations and assess the sensitivity of hypoxia predictions to model resolution, variations in sediment oxygen consumption and choice of physical horizontal boundary conditions. We find that hypoxia predictions on the shelf are very sensitive to the parameterization of sediment oxygen consumption, a result of the fact that hypoxic conditions are restricted to a relatively thin layer above the bottom over most of the shelf. We also show that the strength of vertical stratification is an important predictor of oxygen concentration in bottom waters and that modification of physical horizontal boundary conditions can have a large effect on hypoxia predictions.