

Title:

Deoxygenation Trends and Their Ecosystem Impacts in Atlantic Canada

Authors:

Katja Fennel, Krysten Rutherford, Angela Kuhn, Wenxia Zhang, David Brickman, Katie Brennan, Rui Zhang

Abstract:

The representation of coastal oceans in global biogeochemical models is a challenge, yet the ecosystems in these regions are most vulnerable to the combined stressors of ocean warming, deoxygenation, acidification, eutrophication and fishing. Regional model applications that are nested within large-scale or global models are necessary for detailed studies of coastal regions. We present results from such a regional biogeochemical model for the northwestern North Atlantic shelves and adjacent deep ocean of Atlantic Canada. The model is an implementation of the Regional Ocean Modeling System (ROMS) and includes a lower trophic level ecosystem model with explicit representation of dissolved oxygen. The region is at the confluence of the Gulf Stream and Labrador Current making it highly dynamic, a challenge for analysis and prediction, and prone to large changes. Historically a rich fishing ground, coastal ecosystems in Atlantic Canada have already undergone dramatic changes including the collapse of several economically important fish stocks and the listing of many species as threatened or endangered. We will discuss simulated patterns of primary production and oxygen trends in the context of circulation features and shelf residence times for the present ocean state and present future projections.