Modelling of biogeochemical cycles and climate change on the Continental Shelf: An example from the Pacific coast of Canada

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The development of a quantitative understanding of the interactions between physical, chemical and biological processes is critical for predicting the marine ecosystem response to climate change. Mechanistic ecosystem models coupled to circulation models are important tools for understanding ecosystem dynamics, to generalize discrete observations and to predict plausible ecosystem changes. In this study, results from a coupled plankton/circulation model (ROMS) developed to study factors influencing bloom dynamics on the continental shelf off Vancouver Island, will be presented. Model results show the influence of the Juan de Fuca eddy on the growth and retention of phytoplankton and the importance of different sources of nutrients (i.e. wind-driven upwelling, topographically controlled upwelling, and the outflow from Juan de Fuca Strait) on primary production and biogeochemical cycles. The usefulness of this type of model to assess the potential responses of the marine ecosystem to climate change scenarios will be discussed as well as the limitations of present biogeochemical models to predict future climate change.