Séminaire de Eric Mortenson au LOCEAN

Nom : Séminaire de Eric Mortenson au LOCEAN

Titre : A biogeochemical model study of the recent decline in Arctic sea ice, and implications for air-sea exchange of carbon

Laboratoire :

Nom du conférencier :

Son affiliation :

Date et heure : 20-05-2019 14h30

Lieu : Campus Jussieu - salle du LATMOS, couloir 45-46, 4eme étage

Résumé :

The Arctic Ocean has experienced a marked decline in sea ice cover over the recent era. Given the consequent increase in direct exposure between the Arctic Ocean and the atmosphere, an important question concerns how the uptake of carbon by the Arctic Ocean has evolved with the decline in sea ice. This presentation involves both 1D and 3D studies of the Arctic Ocean through coupled ice-ocean biogeochemical models. In the 1D model, we developed and tested two implementations: first, the addition of sea ice algae coupled to an extant (pelagic) simulated ecosystem, and second, the non-local transport of brine-associated dissolved inorganic carbon and total alkalinity. In the 3D model study, we added the implementations from the 1D studies into a biogeochemical coupled ice-ocean model encompassing the Arctic region, driven by atmospheric forcing representing the period 1980 ? 2015 (with a spinup period from 1969 ? 1979), in order to analyse the evolution of simulated biogeochemical properties in the upper water column and at the sea surface. Our results indicate decline in annual, pan-Arctic sea surface pH (from 8.1 to 8) as well as saturation states of aragonite and calcite, and an increase in sea surface pCO2 and ocean uptake of atmospheric carbon by the pan-Arctic Ocean (from 110 to 140 Tg C) over the period 1980 ? 2015. Our results also indicate that primary production plays an important role in seasonal ocean uptake of carbon. Lastly, regional and seasonal variability of carbon system properties apparent in these results imply that (necessarily) point-wise observations of inorganic carbon system properties in the Arctic Ocean should be considered in conjunction with the inherent variability of those properties, and that models are clear tools for filling in the (unavoidable) gaps in sparse observational data sets in the Arctic Ocean.

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