Geophysical Research Abstracts
Vol. 17, EGU2015-9931, 2015
EGU General Assembly 2015

The emergence of the climate change signal in the hydrodynamic and ecosystem properties of the different regions of the northwest European continental shelf

Sarah Wakelin (1), Yuri Artioli (2), Jason Holt (1), and Momme Butenschon (2)
(1) National Oceanography Centre, Liverpool, UK, (2) Plymouth Marine Laboratory, Plymouth, UK

Climate change on the northwest European continental shelf is forced by a combination of atmospheric, oceanic and terrestrial changes. The impact of changes in the atmosphere is experienced across the shelf, whereas the relative impacts of the oceanic and terrestrial changes vary depending on the proximity to land and to the edge of the continental shelf. All are modulated by the underlying regional hydrodynamics. In previous work for the North Sea Region Climate Change Assessment (NOSCCA) we used time-slice simulations and analysed the differences between average conditions in future and past time periods. Here, using a transient simulation, we study the evolution of climate change and use present day variability to investigate the emergence of the climate change signal from the present day climate. We use a 120-year simulation (1980-2099) of the coupled hydrodynamics-ecosystem model NEMO-ERSEM for the northwest European continental shelf. The model is driven by atmospheric forcing from a CMIP5 OAGCM (HADGEM2, under a high emissions scenario RCP8.5) and ocean/ecosystem boundary forcing from a global NEMO-MEDUSA model (ORCA1, forced by HADGEM2 under RCP8.5). We compare the emerging climate change signal of the North Sea to that of other regions of the European shelf. Some changes, such as increasing temperature and decreasing salinity, occur throughout the simulation timeframe and across the shelf. The projected ecosystem response is more complex with different regions showing different time-varying responses; e.g. after initial decreases in some regions, zooplankton biomass generally increases by 2099, while phytoplankton biomass decreases in the more northern regions of the shelf and increases elsewhere. The present-day European shelf is a sink for atmospheric CO_2 and, in the future projection, the uptake of CO_2 from the atmosphere increases in the southern North Sea and the western shelf regions (west of the UK, Ireland and France) but decreases elsewhere on the shelf, with a potential feedback on atmospheric CO_2 levels.