

## An Ecosystem Models Response to North Atlantic Oscillation like forcing

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An coupled ecosystem - general circulation ocean model has been used to estimate changes in the biological productivity and resulting export of carbon in response to different phases of the North Atlantic Oscillation. We find that the response of the ecosystems depends not only on the physical forcing anomalies, such as changes in the mixed layer depth, but also on the mean ecosystem environment. In the subtropical gyre productivity is limited by nutrient supply and enhanced deep winter mixing during a negative index NAO season results in a slightly increased export of carbon. In the subpolar gyre the response is more complex. During the positive index phase increased and longer lasting deep winter mixing delays the spring bloom by about 2 weeks. Since the system is not nutrient limited the total export of carbon is quite insensitive with a slight reduction. However, in a belt between 40° and 50° N productivity and export are enhanced by 10% following a positive NAO index winter. We can understand this by a the slow response of the ocean circulation where we found an enhanced transport and poleward displacement of the subtropical gyre which persists a few seasons and causes anomalous advection of nutrient rich waters into the eastern subtropical gyre.