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Seasonal and interannual near-surface nitrate variability in the subpolar North Atlantic

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Two years of high temporal resolution (<0.5 days) near surface (<40m depth) nitrate data from the central Irminger Sea is used to explore processes that control mixed layer nitrate in the subpolar North Atlantic. Interannual variability of near surface nitrate concentrations can be at first explained by the intensity of convective overturning that leads to significantly higher nitrate concentrations over the winter period of 2006 compared with 2003. By scaling nitrate with the locally observed mixed layer depth the mixed layer nitrate removal is derived. It is found that under low light conditions, before mid April, new production, and hence carbon fixation, can account for approximately >30% of the spring bloom fixation. Intermittent stratification events can trigger intense pre-bloom events but only over very shallow depth. The temperature to nitrate relationship, which has been proposed in the past to obtain a global view of surface nitrate variability from space, is linear over a certain range of temperatures but not during the productivity phase.