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## Turbulence measurements suggest high rates of new production over the shelf edge in the northeastern North Sea during summer

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The potential for vertical mixing to support new production in the upper layers of the northeastern portion of the North Sea was analysed from observations obtained during the stratified period in July 2016. Five transects across the shelf edge between the relatively shallow central North Sea and the deep Norwegian trench showed a clear frontal structure in hydrography, turbulent mixing, nutrients and chlorophyll a across the shelf edge. Relatively large (up to  $>0.5 \text{ mmol N m}^{-2} \text{ d}^{-1}$ ) nitrate fluxes due to turbulent vertical mixing into the euphotic zone were found at some stations over the shelf edge, while low values ( $<0.1 \text{ mmol N m}^{-2} \text{ d}^{-1}$ ) were found in the deeper open area north of the shelf edge. The low vertical mixing rates implied f ratios less than 0.02 in the open waters north of the shelf edge. In the shallow ( $<50 \text{ m}$ ) southern and central part of the study area, inorganic nutrients were low and nitrate undetectable, suggesting negligible new production here, despite relatively high concentrations of chlorophyll a being found in the bottom layer. Thus, high rates of new production seem to be concentrated around the shelf-edge zone and in association with localized features exhibiting enhanced vertical mixing. We find that the nutricline depth is significantly deeper at the shelf edge and interference with increased mixing in this deeper depth range can explain the increased diapycnal nitrate fluxes. Overall, this suggests that the shelf-edge zone may be the major nutrient supplier to the euphotic zone in this area during the period of summer stratification. Potential impacts on plankton ecosystem structure are discussed.

Reference:

Bendtsen, J. and Richardson, K.: Turbulence measurements suggest high rates of new production over the shelf edge in the northeastern North Sea during summer, *Biogeosciences*, 15, 7315–7332, <https://doi.org/10.5194/bg-15-7315-2018>, 2018.

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