



Horizontal exchange rate controls the new primary production on the Faroe Shelf.

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Situated on the ridge between Iceland and Scotland, the Faroe Shelf is surrounded by warm and saline North Atlantic Water. Almost throughout the year, the on-shelf water is colder than the off-shelf surface water due to more effective cooling in winter over the shallow shelf. A front therefore exist between the on-shelf and off-shelf water. Because of this front, the shelf water is fairly isolated and supports its own ecosystem distinct from off-shelf. This ecosystem has large inter annual variations in total new primary production, which are transmitted through the food chain, giving large variations in the commercial catch of e.g. cod and haddock on the shelf. Model results indicate, that the main factor controlling the new primary production on the Faroe Shelf in spring is the horizontal exchange rate between on-shelf and off-shelf waters. When the exchange rate is high, a large amount of plankton is advected off the shelf, thus decreasing the spring bloom. On the other hand, when the exchange rate is low, the plankton is kept on the shallow shelf, where there is sufficient of light to grow, thus enhancing the spring bloom. The exchange rate is suggested to be controlled by the density difference across the front, which is mainly determined by temperature. This implies control by winter cooling from the atmosphere and it is found, that the mean air temperature in winter (Jan - Apr) has an inverse relationship with the primary production in spring. Thus, cold winters are suggested to increase the primary production by stabilizing the front and reducing the exchange rate. Investigations dedicated to the front have been performed and preliminary results will be presented.