

Interactive comment on “Large-scale forcing of the European Slope Current and associated inflows to the North Sea” by Robert Marsh et al.

Anonymous Referee #1

Received and published: 26 September 2016

General Comments: The manuscript investigates the driving forces of the European Slope Current and also the related inflow of Atlantic water into the north-western North Sea. In this study, a well selected combination of observational data and model results is employed. These data are integrated by means of innovative analytical methods, leading to new insights into the acting mechanisms. The overall impression is that the paper is carefully written in a clear and concise way. I just have some minor comments, which are given below. Therefore, altogether, I could recommend the manuscript for publication after a minor revision.

Detailed Comments: Page 3, line 19: “. . . are usED” Page 3, Section 2.2, model hind-cast: It remains unclear, why ORACA12-N01 data are used at all. If ORACA12-N06 covers a longer period, I do not understand why you do not solely use this data set. Moreover, you must provide more support that a spatial resolution of approx. 10 km

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and a temporal resolution of 5 days are sufficient to describe the relevant processes related to the slope current variability. Page 6, line 4: The argument that the number of drifters is limited does not really hold, since it would be possible to start the simulated particles exactly at the same time and place as in the drift experiment. Furthermore, the argument that sub-mesoscale processes hamper a proper comparison between observed and simulated tracers is in contradiction with the statement made in section 2.2, i.e., that eddy-resolving model data are employed. Page 8, line 16: Please clarify how h_s and H are defined and give a reasoning why you distinguish between shelf and deep ocean. Actually, the Slope Current, which is in the focus of this study, is located at the transition between these two regions. Which equation holds in these transition areas? Page 8, line 25: Related to the previous comment, I do not see why H is always much larger than h_s . Page 12, line 4: The argument here is extremely questionable. If the number of particles entering the North Sea is well correlated with the Slope Current, there is no reason to assume that the definition of the Slope Current is not adequate, when it is correlated with salinity anomalies, since these should also be directly affected by the inflow of Atlantic water. Page 13, line 3: Again, I question why ORCA12-N01 data are used at all, if the ORCA12-N06 data are more reliable as stated here, and cover even a longer period as mentioned earlier. To my opinion, this is unnecessary and just confuses the reader. Page 14, line 23: “Changes OF inflow ...”

Interactive comment on Ocean Sci. Discuss., doi:10.5194/os-2016-61, 2016.

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