

Interactive comment on “Deep ocean mass fluxes in the coastal upwelling off Mauritania from 1988 to 2012: variability on seasonal to decadal timescales” by G. Fischer et al.

Anonymous Referee #1

Received and published: 16 November 2015

Fischer et al. present 25 years of sediment trap fluxes collected off Cape Blanc in the area of permanent upwelling. This is a very impressive data set and it is quite obvious that it is dominated by interannual variations and not by a clear seasonality. It is therefore consistent to investigate the relationship between fluxes and indices of climate oscillations of multiannual or decadal scale (AMO, NAO, ENSO). The authors manage to present this complex matter in a comprehensive and concise way. The paper is well written and well organized and the evaluation of the results is critical and refrains from over-interpretation. Tables and Figures are of good quality and present the results appropriately.

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I have some questions regarding the data used in the paper which need to be clarified. The authors state that fluxes in the upper and lower traps are very similar and therefore use the upper fluxes to fill in gaps in the lower record. The paper cited to show this (Fischer et al., 2009b) presents only one record of upper and lower traps. The authors should show that this can be done for the whole data set despite the vertical distance of about 2000m between the upper and lower traps. Moreover, the authors integrate their data for spring, summer, fall and winter and thus lose some of the original high resolution sampling. The authors should explain their reasons.

Important results are that there is no trend in particle fluxes contrasting the predicted (global) trend of an increase of upwelling and that there is no match between fluxes and the satellite data on chlorophyll concentrations. There is neither a trend in lithogenic fluxes nor in atmospheric aerosol concentrations. BSI flux anomalies show a weak positive correlation with the winter NAO index as upwelling is enhanced during phases of positive NAO. The best correlation of BSi is, however, obtained with the upwelling filament size. There is also no clear or obvious relationship of fluxes with ENSO. There is evidently a decadal variability in the fluxes and AMO may be a possible driving force.

Although no simple driving mechanism of downward fluxes could be identified I find that the study is an important contribution to an understanding of the impact of climate (change) on sedimentation and biogeochemistry. It is one of the longest trap records worldwide but it turns out to be too short to identify the basic mechanisms leading to the observed interannual variability – possibly as the climate oscillations are dominated by a decadal mode. The same is true for satellite observations so that the observed trend of declining chl concentrations will have to be verified in the future.

Specific comments:

Page 17653, line 14: incomplete sentence

Page 17657, lines 17-20: this part on the time delay is too short and difficult to understand. The motivation/results should be explained in more detail.

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12, C7709–C7711, 2015

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