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Interactive comment on "Interactive impacts of meteorological and hydrological conditions on the physical and biogeochemical structure of a coastal system" *by* Onur Kerimoglu et al.

Anonymous Referee #2

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This study introduces a new biogeochemical model, consisting of modified versions of previously published models. Coupled with a hydrodynamic model with an improved mixing scheme, the system is validated in the German Bight region, and used to assess the impact of meteorology and river forcing on a specific flood event in 2013. The conclusion is that an interplay of the two resulted in anomalous conditions, as previously noted in observations.

The paper acts as both presentation and validation of a new modelling system, and an investigation into a specific event. While it could potentially work as separate papers, the paper is well enough written and laid out, and the validation both sufficiently com-

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Discussion paper

prehensive and targeted, that it works well and is an enjoyable and interesting read. I recommend publication in Biogeosciences subject to a few minor comments detailed below.

The biogeochemical model appears to be a work in progress towards a different mixotroph-based model, rather than a model likely to be widely used in its present form, if I've got the correct impression? This is fine, given its structure seems sensible and plenty of validation is presented, but it would be worth adding some discussion about what sets it apart from other similar models, particularly ECOHAM, and what future developments are intended.

Given that it's central to the study, in Section 2.1 and/or 2.2 it would be worth explicitly detailing which variables are used in the atmospheric and riverine forcing, and how they're applied to the model (e.g. bulk formulae? are rivers applied just at the surface or over the full depth?).

"using the 'spatial.cKDTree' package from the Scipy library of Python 3.5." – add the Scipy version number for completeness.

Figure 3 shows the Ems, and that this doesn't have anomalous discharge in 2013. This isn't mentioned or discussed in Section 3.1, and should be. Also, the "dashed blue lines" appear solid.

"Simulated temperature and salinities ... (Fig. 5) ... exhibit no signs of systematic deviations or biases." The calculated B* values are near-zero, but by eye it looks like there's a cold bias, particularly at colder temperatures, and that salinity is usually too high. Is this just a trick of the eye, or are the simulated and observed distributions different? Please also state what B*, rho and n are in the caption of Fig. 5, as per Fig. 6.

"(Fig.8) ... The ability of the model to capture the sharp increase in DIN during June/July 2013 at the Helgoland station suggests that the spreading of the plume

of the Elbe-Weser rivers following the flood event was realistically reproduced." The model completely misses the peak earlier in the year, and also in early 2014. Can you be confident therefore that this result was obtained for the right reasons?

In Fig. 7, plotting the average in white is confusing – I initially thought there were separate yellow/blue lines either side of it, and the white was blank space. Plotting it in dark yellow/blue might be better. Also, make clear in the caption that the line indicates the average and the shading the standard deviation (I assume this is the case?).

In Fig. 14 it would be best to avoid plotting red and green together, as this renders it inaccessible to those who are red-green colour blind. (Disclaimer: I'm not colour blind myself, so can't say for sure.)

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