Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2020-165-RC1, 2020

Biogeosciences Discussions
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EGU

Interactive comment on "Quasi-tropical cyclone caused anomalous autumn coccolithophore bloom in the Black Sea" *by* Sergey V. Stanichny et al.

Anonymous Referee #1

Received and published: 26 May 2020

The study is devoted to a very important issue – the response of phytoplankton to meteorological forcing. It is usually very difficult to assess this impact via field observations. The presented study, in which the blooms of diatoms and coccolithophores were traced at the same time after the strong exposure to wind, is a new valuable insight into such processes. The observed sequence of diatom-coccolithophore blooms is also a fairly new knowledge, which was reported for a few places in the oceans, including the Black Sea. At the same time, this is important because it can clarify one of the main causes of coccolithophore blooms – changes in the chemical environment. Of course, coccolithophores are extremely important from the point of view of the global carbon cycle, since these algae export to bottom the larghest amount of carbon in in-

organic form. Based on these considerations I want to see this paper published in the Biogeoscience.

However, in its current form it needs serious improvements. 1.) The structure is illogical. First, the diatom bloom began, but first the figures and text first describes the coccolithophore bloom. The Results already contain a lot of discussion. Because of this, the ultra-small Dissuasion is 1 page. It would be more logical to combine both sections into one "Results and Discussion" section. 2.) The text contains many typos and negligences (see my comment in the text). English needs to be carefully edited. 3.) The presentation of the material is good. The main problem is commenting on the results and explanations. They are completely unconvincing.

130 "The reason for the initial increase in Rrs values was not vertical, but horizontal advection. . . This flow was well traced in Chl maps (Fig. 4a, b, c)"

This statement was not supported by any evidence. Moreover, from all possible explanations, it seems less realistic.

The distance from the Danube river mouth to the south-western corner of the sea where the Chl bloom began is approximately 500 km along the coast. Fig 4b shows bloom start 4 days (or less) after the cyclone end simultaneously along the 500 km Anatolian coast. Taking the Rim current velocity (0.3 m/s – 25 km hour) we can understand that these river waters can reach the nearest place of bloom in 20 days, and therefore cannot be the reason for this. In addition, it is obvious that within a 20-day period all ultrahigh nutrients will be consumed by phytoplankton (the graph in Fig. 3 shows well that after 2 weeks such blooms disappear on the surface).

From fig.4 it also is not follows that the high Chl from the west coast (panel a) was shifted to the east (panel b). This is just the authors' assumptions. It is strange that earlier they showed how the cyclone involved the nutrient-rich deep water to the sea surface and now they say that it is not the reason for bloom. The same mixing processes most probably entrained deep nutrients into the mixed layer on the western and

south shelfs, causing an Chl increase. The most obvious explanation for the bloom in the western center is the growth of phytoplankton. At least, it is proved by uplifted deep water (Fig. 1).

145 “Part of the turbid Danube waters during this period moved across the isobates and penetrated a considerable distance into the central part of the sea (Fig. 2c, 4c)”.

Again, no evidence for such a claim. The authors look at the green color in the center of the sea, which joins the shelf waters, and concludes that it came from the shelf. Why are they sure that this is not the growth of phytoplankton in the western center after the action of the cyclone?

170 At the velocity of 0.45 m s-1 (Fig. 1e), the particles will be transported on 1000 km in 3 weeks, which coincides well with satellite optical measurements (Fig. 2)

The fig.1f (not 1e) shows that the velocity of 0.45 m s-1 is the maximal on some areas along the western coast. 0.4 m s-1 will be a very optimistic estimate of the average current velocity. In this case 1 month is needed to distribute a bloom to the eastern part. Simultaneously, fig 2c shows that bloom occupy the eastern part of Turkish shelf after 10 days after bloom 600 km eastward. Plus, fig 2c demonstrates that from approximately (because the 8-day centering) from 10 to 30 October occupy the same area, without any shifting. It is even approximately not look like as a spot of high concentration moving among poor waters in eastward direction. Moreover, the spots of high concentration are stable and only slightly shifting to the east. For example, spot of bloom at 33 longitude moved to 34 longitude, which is much more seems to be truth. Such pattern points on local slope upwelling which was intensified under action of cyclone and Rim current activation. In any case, the explanation, that the current bears the bloom to the east is not supported by presented material.

175 “The upwelling in the center of the west cyclonic gyre was a permanent source of nutrients and phytoplankton growth, from which the bloom stretched to the eastern shore “ What drives this constant source of nutrients? Pure guess! And how does

this coincide with the statement that “The reason for the initial increase in Rrs was not vertical, but horizontal advection”?

Nevertheless, despite serious criticism, I recommend that the Editor ask the authors to revise the ms, first of all, while interpreting the results and their explanations, paying attention to real facts, and not to the idea that you liked initially.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2020-165/bg-2020-165-RC1-supplement.pdf

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