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Interactive comment on "Prioritization of the vector factors controlling *Emiliania huxleyi* blooms in subarctic and arctic seas: A multidimensional statistical approach" *by* Dmitry Kondrik et al.

Anonymous Referee #2

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The manuscript by Kondril and colleagues, describes a performant methodology to predict the surface and the intensity of the blooms of Emiliania huxleyi from physical oceanographic parameters (SSS, SST. . .) that can be estimated from satellite imagery. This is very interesting because it would permit to test which parameter is pertinent for blooms and to test future impact of climate change on coccolithophore blooms in those area. The methodology is based on Random Forest. This is a powerful tool. The results of this methodology seems very promising since it unable the prediction of the bloom quite efficiently. Therefore this work suitable for publication in BG.However I do

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not recommend publication in its present form and suggest major revisions, and this for 4 mains reasons :

1- Beside the methodology advances, we do not learn enough on the blooms itself. For exemple the manuscript does not describe what are the conditions that drive a E. huxleyi bloom. I understand the Random Forest is not the tool developed for that. But it could be turn as a diagnostic tool by playing with and/or changing some parameters in the model in order to describe the effect of those changed parameters. For example it could be tested what are the consequence of a temperature change of 1°C on the bloom repartition. At present, the only added knowledge on the bloom is that 'E. huxleyi phytoplankton were highly adaptive to the environmental conditions and capable of arising and developing within a wide range of FFs' (P10 L6). This is quite disappointing because it is known already, and express the absence of the understanding on the reason of those bloom. It is therefore difficult to see what this paper add to our current knowledge of the E.huxleyi blooms.

2- An interesting discussion should be made on the surprising discovery that the bloom can be predicted with only physical parameters and not chemical ones. In particular, often the nutriment concentration or the carbonate chemistry are seen as important factors for predicting blooms (for example in upwelling area). Here the blooms can be predicted without those. This is diagnostic of some peculiar response of the phytoplankton to the physical condition solely. This discussion is missing.

3- The figures are often are not informative enough: For example what are the informations provided by the large scatters in SST/concentration in Fig. 3. Similarly the overlaps shown in Fig. 2 are non informative. How the 3 maps showing the predicted models quality in Figure 4 have been chosen ?

4- The manuscript is poorly written with many sprawling sentences. The terms used are often vagues with the common use of positive or qualitative expression such as 'highly consequential', 'gigantic'. Often the sentence are not precise : (e.g. 'E. huxleyi is ca-

pable of affecting both the marine ecology and carbon fluxes at the atmosphere-ocean interface') (without saying in which direction it affects marine ecology and carbon fluxes and in which quantity).

In conclusion this manuscript present a new and powerful methodology without its application. The manuscript should be written in a more concise manner and with more precisions.

Some minor suggestions bellow: -P1L9 replace 'a coccolithophore E. huxleyi' by 'the coccolithophore E. huxleyi'

-P1 L13 remove 'that is known to significantly'

-P1 L14 remove 'and can be retrieved from remote sensing data'

-P1 L22 write each sea target or each targeted sea ?

-P1 L30 THE (not a) unicellular

-P1 L31 remove 'veritably'

-P2 L2 remove 'the waters with the trophic status within the' replace range by waters.

-P2 L6 find another way (with less emphasis) to write this obscure sentence 'This assertion is substantiated by the typical scale of the E. huxleyi phenomenon'

-P2 L7 remove 'gigantic' and add 'large' between 'covering' and 'marine'

-P2 L17 explain 'forward and feedback mechanisms.'

-P2L31 replace 'while in real life' by 'while in natura'

-P2 L32 replace 'strains' by 'morphotypes'

-P3 L20 'the above stated vision' Vision is presumptuous.

-P3 L23-25 remove because not necessary

C3

-P10 L20 'highly consequential' : precise how.

-P11 L10-12: Explain in details this. Because it appears to be very important but not developed enough.

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