Interactive comment on “Impact of decadal reversals of the North Ionian circulation on phytoplankton phenology” by Héloïse Lavigne et al.

Anonymous Referee #1

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General comments

Several phytoplankton phenology parameters, such as the chlorophyll maximum value in March, chlorophyll max increase, etc. are obtained from satellite imagery of the Ionian Sea and related to both the documented effects of BiOS cyclonic-anticyclonic circulation reversals in the basin and air-sea fluxes. This is done to demonstrate the high impact of this physical forcing on the Ionian Sea productivity. I find this paper extremely interesting and ground-breaking. A just biological "add-on" to the knowledge concerning BiOS phenomenology. The Authors have resorted to a varied and complex dataset to illustrate their results, indicating also good interdisciplinary teamwork. The
text is well-written (needs English improvement, though) and structured. It is clear and results seem to me more than solid, and very interesting. Especially, it is a sort of "eye-opener" indicating that biological/trophic monitoring CANNOT be confined to the coasts, as often happens: basin-wide variability is just as important to gain insight on e.g. changes occurring in the marine trophic chain. A similar study on secondary productivity (or fisheries) would be extremely interesting. Therefore, I recommend publication, after the minor corrections reported below. The list is long but they are mainly linguistic corrections.

Form

The English of the manuscript is reasonable but needs improvement. I tried to help with the list of corrections suggested below.

Particular comments and suggested text corrections

Abstract

Page 1


1 Introduction

either with "a subtropical (subpolar) gyre" or with "subtropical (subpolar) gyres". Line 17. "which maintains the downwelling (upwelling)". To my knowledge, a stationary gyre, such as the great gyres of the oceans, doesn’t cause up- or down-welling (vertical velocity should be zero in a common stationary case). It’s a quasi-geostrophic, i.e. time-evolving situation that does. I do understand, though, that nutrients are kept more (less) distant from the surface at the center of an anticyclonic (cyclonic) feature, e.g. because of its depressed (uplifted) pycnocline. Please correct or comment (and provide reference). Lines 18-20. This is correct because upwelling (downwelling) is actually caused when a cyclonic (anticyclonic) gyre FORMS. Line 25. "time-life" -> "lifetime ". Change throughout text. Line 26. "spring" -> "the spring". Line 31. "(NIG, see Figure 1)". The NIG is absent from either Fig. 1 or its caption. Please highlight and describe it clearly. Line 34. "time-scale" -> "time scale". Non need for hyphen, change throughout text.

Page 3 Line 1. "feedback with the Adriatic Sea" -> add "(see below)". Line 3. "the vertical structure... have been" -> "the vertical structure... has been" Line 21. "during cyclonic" -> "during the cyclonic". Also, "downlift" -> "depression" or "lowering". There is no such thing as "lifting down". Change throughout text, please. Line 26. "initiation" -> "start"

2 Data and Methods

2.1 Satellite and modelling data

2.2 In-situ data

Page 5 Line 1. "from Coriolis" -> "from the Coriolis". Line 11. "nutrient depleted" -> "nutrient-depleted".

2.3 Phenological metrics


3 Results and Discussion 3.1 Physical and chemical characterization of the NIG

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Line 3. "Time-series of ADT" -> "The time series of ADT" Line 4. "1992-1997." -> "1992-1997. (Figure 2a)" Please cite figure right away, for the ease of the reader. Line 4 "Anticyclonic" -> "The anticyclonic". Line 6. "circulation was" -> "the circulation was" Line 7. "blooming period" -> "bloom" (suggested: "blooming period" in English sounds somewhat vernacular!) "ADT difference" -> "the ADT difference" Line 8. "Resulting values" -> "The resulting values"; "on Figure 2a" -> "in Figure 2a"; "referred in" -> "referred to in". Line 9. "Although, ICI" -> "Although the ICI". Add "the" and eliminate comma. Line 10. "by seasonal" -> "by the seasonal". Line 12. "small scale" -> "small-scale". Line 13. "2006, circulation" -> "2006, the circulation". Line 14. "On Figure 2b" -> "In Figure 2b". Line 17. "higher ADT value" -> "a higher ADT value". Line 18. "transition from an anticyclonic (Figure 2d)". I have difficulty in attributing an anticyclonic circulation to the ADT pattern of Fig. 2d. Could the Authors better illustrate this circulation? By eye, it doesn’t seem conceptually (sign-wise) different from the cyclonic
patterns, though with less negative ADT values in the north. BTW I am OK with Fig. 2b's anticyclonic pattern, but Fig. 2d doesn't look like Fig. 2b. Line 20. "June 2012, NIG" -> "June 2012, the NIG". Line 21. "the period" -> "the periods". Line 22. "Resulting" -> "The resulting". Line 25. "to the cyclonic" -> "to describe the cyclonic". Line 29. "a steep gradient is observed" -> "a steep gradient, implying isopycnal southward deepening, is observed".

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Line 5. "when NIG" -> "when the NIG".

3.2 General patterns of phytoplankton phenology in the Ionian Sea

Line 12. "see Figure 4, D'Ortenzio" -> "Figure 4; D'Ortenzio". No need for "see"; "Highest" -> "The highest". Line 15. "lowest" -> "the lowest"; "from October" -> "starting in October"; "Date_GR_Max" -> "The Date_GR_Max". Lines 17-18. "between northern" -> "between the northern". Line 18. "on the Hovmoeller" -> "in the Hovmoeller". Line 20. "centered on March" -> "centered in March"; "38°N-39°N band" -> "38°N-39°N band": needs a space. Line 22. "of isopycnal" -> "of the isopycnal"; "during cyclonic" -> "during the cyclonic".

3.3 Impact of the NIG circulation on the [Chl-a] phenology

Line 26. "displays interannual average, over period July 1998 – June 2012" -> more simply: "displays the July 1998 – June 2012 average". Also, eliminate commas. Line 27. "to interannual" -> "to such interannual". Line 29. "CHL_Year) with" -> better: "CHL_Year), indeed with". Line 31. "only March period is considered" -> "March only is considered"; "CHL_March" -> "the CHL_March"

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Line 1. "March which" -> "March, which". Line 4. "In South Ionian" -> "In the South Ionian". Line 5. "by BiOS" -> "by the BiOS". Line 7. "are anticipated by" -> maybe "are early by"? Not sure anticipated is OK. Pls check; "when circulation" -> "when the
circulation. Line 15. "up to January" -> "to January"; "most of time-series" -> either "most time series" or "most of the time series" (no hyphen). Line 16. "generally few" -> "generally a few". Line 17. "of [Chl-a]" -> "of the [Chl-a]". Line 23. "as it can" -> "as can".

3.4 Role of the NIG circulation compared to the interannual variability in MLD (focus on the region S3)

Section title. I'm not sure about the title construction "Role of... compared to...", a little illogic. Maybe "NIG circulation patterns and MLD variability" or "Role of the NIG circulation in the variability of the MLD" or "The NIG circulation patterns compared to the ... MLD".


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Line 1. "were anticipated to" -> "occurred as early as" or "were brought forward to". "to anticipate" means to expect something (check), not to occur early. Lines 2-3. "This...2012". Why don’t Authors overplot buoyancy loss anomaly w/ respect to average in Fig. 6 and refer to Fig. 6 in sentences like this one? Once again, words are more cumbersome to digest without a figure. (Add another axis on the left with % difference buoyancy loss). Line 3. "compared to the average for the period 1999-2012" -> "compared to the reference 1999-2012 average". Line 4. "shallow winter MLD" -> "a shallow winter MLD"; "nutrients inputs" -> "nutrient inputs" Again, adjective-substantive always singular, even if nutrients are more than one type, in this case. Line 4. "to surface layer" -> "to the surface layer"; "consequently the spring bloom" -> "consequently

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4 Summary and Conclusion -> 4 Summary and Conclusions

Line 10. "supply in the surface layer" -> "supply to the surface layer". Lines 10-11. "high all along the year" -> "high year-round". Line 13. "sustains phytoplankton bloom"
"sustains the phytoplankton bloom". Line 19. "and winter deepest MLD" -> "and the winter deepest MLD". Line 25. "large amount" -> "a large amount".

Figures and captions

Figure 2 caption. "(S1 – S2, see Figure 1c)" ->"(S1 – S2, see Figure 1b)". Fig. 3 caption. Maybe add "black dots indicate in situ stations used for the maps". Figure 4 caption. "satellite [Chl-a]" -> "8-day satellite [Chl-a]". Remind reader of temporal resolution. Figure 5. Even though you have units spec’d in the caption, I suggest you add the units on top of the palettes, i.e. mg m-3, month (this not strictly necessary) and %. Always for the ease of the reader. It can be done quickly, e.g. w/ Powerpoint. Fig 6. Characters are a bit small, in the Fig. Please enlarge (in view of drastic figure reduction by editorial process). Also, please add units on axes. Figure 7. Again, characters are small and isopycnal line almost invisible. Please enlarge chars, and thicken and change color to line.