

First of all, we would like to sincerely thank both reviewers for their very thorough and, above all, constructive reviews. We have followed most of their suggestions whenever possible and honestly believe that the revised version has been significantly improved.

The main changes include the removal of some parts of Section 4, as they were somewhat repetitive. We have also moved Figure 5 to the Supplementary Material and revised several figures to improve their clarity. In addition, we have expanded Sections 5 and, in particular, Section 6, where we review the current organizations devoted to the coordination and promotion of observing systems and discuss their strengths, weaknesses, and future perspectives.

We have made a brief bibliographic survey of the MonGOOS impact and included a glossary in supplementary material.

We have carefully reviewed all references and incorporated additional ones suggested by the reviewers.

One of the most interesting points raised by the reviewers was the possibility of carrying out Observing System Experiments (OSEs) and Observing System Simulation Experiments (OSSEs). Although this is beyond the scope of the present work and would deserve a dedicated study, we fully agree that it is an important line of research. In our opinion, this is one of the key activities that MonGOOS and its Steering Committee should promote in the near future. We have acknowledged this point in the revised manuscript.

In addition to these general comments, please find below our responses to the main and detailed comments. Our replies are highlighted in bold.

General comments.

The manuscript presents MonGOOS, the regional alliance centered on ocean observing systems in the Mediterranean Sea. The study is grounded in a census of these systems, conducted in consultation with regional observation actors across the basin. The consultation methodology is clearly framed, which strengthens the openness and thoroughness of the inventory. While the manuscript section ordering is classical, it is clear and logical, and effectively supports the paper's central aim. I particularly appreciated the contextualization effort given to (i) describe observing systems, (ii) MonGOOS's role within the broader system of global and regional alliances, and (iii) the authors' justification of the chosen terminology. Overall I think the paper fits its central purpose and will be useful for the community and recommends acceptance with minor revisions based on the two subsequent points.

My principal criticism concerns the stated goal of “analysing the current state of the Mediterranean observation capabilities” to “evaluating strengths and weaknesses to outline a path for future development,” (l175-180) which I find presently under-done, given its prominence as a primary aim of the paper. A complete assessment of strength and weaknesses of the observing system would compare modes of ocean variability against existing observational capabilities, in terms of both resolution and spatio-temporal coverage. I do acknowledge that such an analysis is not feasible for each and every EOVS at the scale of the Mediterranean basin (especially at the paper level). I find that this point could be tuned down

or discussed as a perspective. As an alternative approach, I suggest the authors connect their manuscript more explicitly to the official EOVS framework (<https://doi.org/10.3389/fmars.2026.1737002>). Stating for instance which EOVS fall within MonGOOS's scope ; which EOVS should be better observed for societal needs ; and quantifying how often each EOVS is addressed by observing systems. These simple additions would allow to quantitatively pinpoint underrepresented variables or categories of variables (physical, biogeochemical, and ecology & ecosystem) and would grant a firmer basis to the discussion section.

**This is a very interesting point, and we have partially followed this suggestion. First, we have linked our compilation of observation platforms for EOVS to the work of Martín Míguez et al. (2026), in which a detailed discussion and definition of EOVS is provided.**

**We also agree that it would be very valuable to perform Observing System Experiments (OSEs) or Observing System Simulation Experiments (OSSEs), as also suggested by Reviewer #1. Such analyses would make it possible to assess the actual capabilities of current observing systems and programs, identify existing gaps, and determine priorities for future improvements.**

**However, the main objective of the present work was to compile the existing observing capabilities, including programmes, platforms, devices, and infrastructures, and to broaden the community of researchers and institutions involved in MonGOOS so that this inventory can be easily updated in the future.**

**For the time being, the assessment of the strengths and weaknesses of the current Mediterranean observing system is based solely on the review of the information compiled in this work. We believe that the type of analysis proposed by the reviewer is highly relevant and would provide valuable insights; however, it would require a dedicated study specifically designed for that purpose.**

**Nevertheless, we have accepted this suggestion and have added a statement in Section 6 indicating that this should be one of the priority activities of the MonGOOS Working Groups in the future.**

Second, I think the manuscript's form requires tightening. Figures could be improved for aesthetic clarity and, in some cases, modified to better serve their intended purposes. These issues are flagged in the specific comments below. While the manuscript's ideas flow smoothly, I found the writing quality to be uneven. Many sentences need rewriting (e.g., in the section on infrastructures) for typos, grammatical errors, repetition, and inconsistencies. Sections are also not sequential; section 4.6 appears twice. Finally, there are inconsistencies in the references that reference-management software (e.g., Zotero) should easily resolve (e.g., "Milglietta" instead of "Miglietta"; "Liubarsteva" vs. "Liuvaresteva"). These issues are itemized in the technical corrections below.

**Thanks very much for this comment. We agree.**

**We have shortened some parts of section 4 and we have moved Figure 5 to supplementary material. We have made an exhaustive grammar and style review and also reviewed all the references. We have changed some figures in order to make them clearer and we have**

**included bathymetry in Figure 10 for including information about the coastal or deep character of stations.**

**By the way, we have reviewed and found that it is Miglietta. We have corrected for Liubartseva.**

Specific comments

line 141: the recent publication of the GOOS on EOVS could be referred to: GOOS Essential Ocean Variables: the backbone of a sustained and evolving global ocean observing system (10.3389/fmars.2026.1737002)

**Thanks very much for this recommendation. We have included this reference, which we have found very interesting and appropriate for our work. We have also used some references found in that work.**

line 142: What are non-essential variables ? I guess the authors mean variables recognizable as non essential by the GOOS which is not much when considering for each EOVS, all supporting variables, sub variables and derived products associated (see paper above).

**The reviewer is right. What is the meaning of non-essential? We state now in the new version that we simply mean those variables not included in the current list proposed by GOOS and collected in Martín Mínguez et al., 2026 (for instance its Figure 2).**

line 304-311: HFR are present on OceanOPS but not listed here.

**The reviewer is right. We have corrected this omission.**

line 318-334: The authors define the terms they will use to refer to each specific observing system. This paragraph is dense and difficult to follow, especially since it is based on a semantic analysis. To simplify reading, I suggest adding the item names in bold maybe at the beginning of each sentence and then to define each of them.

line 344: OBSWG appears here for the first time apart from within the abstract and could be redefined.

**The reviewer is right. We have corrected and included the definition.**

Figure 2: On the preprint version, I could not identify the blue bars cited in the text, they appeared mostly white with some black or blue dots with blue dots being referred to within the figure label. Colors could be changed for simpler filled patterns.

The figure caption could be rephrased for clarity especially: Grey bars show the number of institutions directly reached out for each country / that sent some kind of answer . In panel A, I am not certain to read the figure well: From my understanding the gray bars show the initial number of forms sent per country, the white bars indicate the number of replies obtained and the red bar, the total number of replies combining direct replies from institutions and indirect information obtained by the authors. If my interpretation is correct, a flat (or unstacked) bar diagram might be more suited than a stacked one. It would better highlight the number of answers per category and respectively to each country and better frame the consortium

initiative to reduce network-driven biases. I am wondering if panel B is necessary here as countries are already recalled in panel A.

**The reviewer is right and reviewer #1 made the same criticism. We have changed Figure 2 and we use the colors black, white and grey for the bars. They are now seen clearly.**

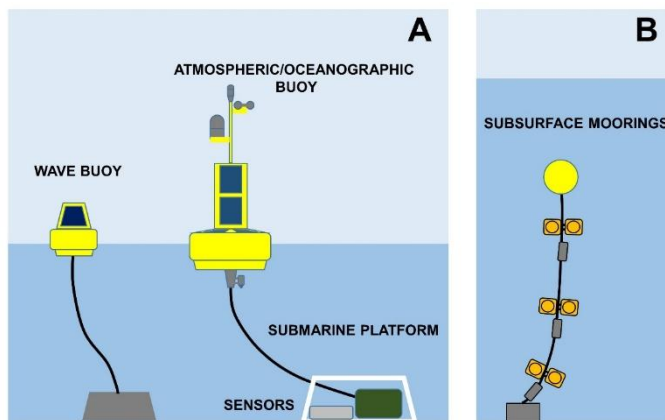
**On the other hand, we believe that this figure is now clear enough.**

line 490-517: This part (and figure 5) could be added in the supplementary material or in section 2 so to smoothen the manuscript flow.

**We have followed the reviewer's suggestion and Figure 5 has been moved to supplementary material.**

**Figure 6, naming of buoy type seems inconsistent within figure 5, the text, the legend of figure 6 and its caption: e..g, submarine platforms/sea floor.**

**We agree with the reviewer in that there are many names for these types of devices. This is the reason why we have adopted a new one: "surface or subsurface moored buoys and submarine platforms". We think that this is consistent with the "old" Figure 5 that is now Figure S1 in supplementary material. Wave buoys, atmospheric/oceanographic buoys in Figure S1 correspond to surface moored buoys. Submarine platforms in Figure S1 are within the name of this category and subsurface moorings in Figure S1B correspond clearly to subsurface moored buoys in the name of the category.**



line 565: pH is not measured at all at the basin scale, should it be monitored in the Mediterranean Sea? Is it a critical drawback of the observing system ? This is the type of element that would be interesting to be pushed further in the discussion to better highlight forces and drawbacks of the current observing system.

**The reviewer is absolutely right. We have extended on this point in the discussion section as suggested by the reviewer.**

Figure 7: I think that simpler colors and filled patterns could be chosen by the authors so as to have clearer figures (such as plain colors). I think that panel A and B y-label, shows the number of active floats per year rather than the number of deployment. I wonder why the total number of floats (black line) is below the Deep and Coastal floats number. Here again, I think that an unstacked bar chart would ensure better interpretation and comparison of numbers of

active floats per year in respect to their categories. Stacked bars chart is however fitting panel B.

**The reviewer is right. We have re-made this figure in order to make the color-code simpler. We have tried to keep it accessible for color-blinded persons.**

**The total number is below the sum of all types (then below than deep and coastal) because it is frequent that the same float belongs to two categories.**

Figure 8: I find panel A not so useful. Rather than a figure of all float positions (taken at what time? deployment, midlife, end of life?), the authors could represent a heatmap of profile density which will better highlight sampling (in?)homogeneity. The “present date” could be recalled in panel B

**We partially agree with the reviewer. Panel A simply gives a historical perspective about the number and types of Argo floats that have been deployed along history, but this information is already provided in Figure 7A. However, it does not consume much space and besides this, it provides geographical information about the deployment sites of the floats. In this way, this section is not so poor in references and, furthermore, we emphasize the importance and some of the applications of these devices.**

Section 4.5, The surface drifter section is relatively poor in references:

**The reviewer is right. We have included some more references, not just to increase the number of references, but also to highlight the importance of these devices.**

line 600 EMODnet Physics lists more than 600 drifters in the Mediterranean Sea. Is this historically cumulated drifter number or just an active drifter number ?

**The reviewer is right. They are the number of drifters used historically through the years. It has been made clear in the new version.**

Figure 9: Similarly to the Historical Argo array, I find the representation of surface drifters positions since 2001 not so useful. Maybe a historical bar chart of the number of drifters per year might better show the current state of the observing system? Trajectories of currently operational drifters could also be added to better frame the Lagrangian aspect of these devices.

**As in the case of Argo floats, we believe that this figure helps the reader to have an idea about the sampling effort carried out throughout the years.**

Line 632: CAL and VAL are relatively different things for satellite remote sensing. While I can easily imagine validation exercises, I do not know any calibration exercise done at this level. Could the authors give a reference ? (One for validation and one for calibration of satellite sensor with data sampled with ferry boxes).

**The reviewer is right. These statements should be accompanied by the corresponding references. We have included Petersen (2014) which proposes the use of Ferry Box for validation and Petersen et al. (2003) where the use for calibration is proposed and Petersen et al. (2008) where Ferry Box data are used to calibrate algorithms for chlorophyll in coastal waters.**

Line 659 to 667 The authors could specify what criteria distinguishes periodic, quasi-period and occasional (every year, twice a year, once every decade ?). This section discusses periodic and quasi periodic programs but this concept is neither shown in Table 6 , in figure 11 or later-on in the text. As such I suggest removing this sentence fully.

**The reviewer is absolutely right. This must be defined, especially when this work is intended to explain the different types of sampling strategies and monitoring programs. We have included this paragraph: “Here, a periodic cruise is defined as a cruise repeated at regular time intervals, typically on a weekly, fortnightly, monthly, quarterly, or annual basis, notwithstanding occasional gaps due to technical issues or adverse weather conditions. In contrast, a quasi-periodic or occasional cruise is repeated whenever circumstances permit, depending on the availability of funding and research vessels. Such cruises are generally conducted at larger spatial scales and may be repeated at irregular intervals, with gaps of one, several, or even more years between successive surveys.”**

Figure 9 time series stations are hardly distinguishable with repeated cruises when both are spatially overlapping as in the Golf du Lion. On this figure I would find it particularly relevant to connect cruises and time series stations names with their spatial imprint / location. A code could be used (e.g, 1,2,3,4, ...) matching a text box in the figure, with rows number in table 6.

**We have tried several forms of nomenclatures and labels in this figure, but certainly it is very difficult because there are many different stations. This is our best. But the important thing is that all the information is clear in the Excel files in supplementary material.**

Figure 11 panel A and C, grey triangles above Crete do not relate to any country in the legend. Maybe just recall that they are finished and that these are the Greek systems.

**Ok! We have followed this suggestion and included in the Figure legend the explanation for the two grey triangles which, in fact, were from the former Poseidon Greek observation system, which is not active because of the lack of funds.**

Line 958: From this paragraph, I am wondering if the coverage should be even ? For instance, are there regions that should be targeted in priority for HFR stations? Are there regions that would not need such an instrument ? These questions are just examples of content that could be explored further. Observing System Simulation Experiments (OSSE) could answer these questions (how to prioritize future development of the observing system?) but they are never mentioned within the perspectives.

**The reviewer is right. We have included a paragraph in the section discussion, weaknesses and future perspective, explaining the importance of carrying out this kind of exercises in the future. We agree with the reviewer about the importance of these analyses for actually evaluating the capabilities of the Mediterranean observing systems (or those of any other region). However, we have not done it here because we believe that this deserves its own work.**

Line 960: even and homogeneous coverage of drifting platforms within the basin was not shown (see comment above on Argo Figure).

From line 980: to what does BGC variables refer to ? I have the impression that this generic term could be divided into Biogeochemical variables and Ecology and Ecosystem variables if the authors follow EOVS categories from the GOOS.

**In section 2 it is described what means BGC in the context of Argo floats: “(ii) BioGeoChemical Argo (BGC-Argo) floats are equipped with sensors for dissolved oxygen, pH, nitrate, chlorophyll-a, suspended particles (via optical backscattering), and irradiance”.**

Technical correction

- Across the document: The authors need to choose a convention in the use of determinants before acronyms: “GOOS” or “the GOOS” / “EOOS” or “the EOOS”.

**Ok! Corrected. We have written it without the article.**

- line 159: I suggest rephrasing “[...] and adaptation to the effects that climate change may have on coastal populations and beyond [...]” to “and mitigate climate change effects on coastal populations and beyond”.

**Ok! We have followed this suggestion and rephrased according to the reviewer's proposal.**

- The following sentences could be simplified/rephrased for clarity: “In other cases, there are underwater stations located on the seabed (usually in shallow waters) that measure the above mentioned variables at the depth at which the underwater station is located.” (l. 242). The sentence end is slightly awkward.

“Unlike stations anchored to the sea floor, these devices drift freely with the current and therefore, they have a Lagrangian character, in contrast to the Eulerian nature of fixed platforms” (l. 253) Could be simplified.

**We have maintained the present phrasing.**

“Argo floats periodically descend to a predetermined depth and then, during the ascent, they record pressure, temperature, conductivity, and sometimes biochemical variables, depending on the float type: (i) Core-Argo floats provide temperature and salinity (T/S) profiles down to 2,000 dbar. (ii) BioGeoChemical Argo (BGC-Argo) floats are equipped with sensors for dissolved oxygen, pH, nitrate, chlorophyll-a, suspended particles (via optical backscattering), and irradiance. (iii) Deep-Argo floats are capable of sampling to depths of 4,000–6,000 dbar.” (l. 255)

This is a long-sentence which could be separated into two: one for the cycling and one for the observed variables

**In this case we have retained the present wording. We use a colon after “float type: “ and then, there is a full stop after each type of Argo float: “Argo floats periodically descend to a predetermined depth and then, during the ascent, they record pressure, temperature, conductivity, and sometimes biochemical variables, depending on the float type: (i) Core-Argo floats provide temperature and salinity (T/S) profiles down to 2,000 dbar. (ii) BioGeoChemical Argo (BGC-Argo) floats are equipped with sensors for dissolved oxygen, pH, nitrate, chlorophyll-a, suspended particles (via optical backscattering), and irradiance. (iii) Deep-Argo floats are capable of sampling to depths of 4,000–6,000 dbar”.**

“For instance, underwater gliders are self-propelled units that operate without a propeller or traditional thruster, and move horizontally and vertically according to a predetermined mission plan.” (l. 273). Repetition

**We are sorry, but we find the present wording clear.**

“Manual observation methods include all measurements taken from oceanographic or commercial vessels that must be moved to the location where the measurement is performed (oceanographic station).” (l. 278)

“This tool was conceived to allow operators to contribute detailed metadata to a centralized inventory, which can then be used by data portals and aggregators to harmonize and update their own metadata records.” (l. 464)

“and one of the Core-Argo is a coastal one” (l. 563)

Line 631: “Moreover, Chl-a data can be used for satellite validation/calibration, while it has been proven as a helpful tool in the study of water circulation, in particular when SST is assimilated into prognostic numerical circulation models to improve their accuracy” (Korres et al., 2014).

**In this cases we have retained the present wording.**

Line 732 : “the relative scarcity of them in the Eastern Mediterranean” to “their relative scarcity”

**Ok! Corrected!**

“Ocean Gliders form a mature observation network within GOOS, coordinated at the international level by the OceanGliders program from GOOS (<https://www.oceangliders.org/>).” (l 783) GOOS is repeated twice.

**Ok! Corrected!**

“Such missions were aimed at testing this instrumentation or the study of the water masses and ecosystem functioning in the frame of specific research projects (l. 793)”

**Ok! We have rephrased it.**

Paragraph from line 821 to 827 needs tightening and correction. e.g.: “the southern riparian country” this sentence ends on an adjective ; “it has not a budget” should be : “does not have a budget” ; ...

**Ups! Corrected!**

Similarly the next paragraph on EuroGOOS which needs rewriting: ... the same objectives as (instead of) aforementioned organization ... ; Inconsistent use of verb form : to foster ; promote ; providing ; favoring ; as a non-profit organization ; in Brussels instead of at Brussels

**Ok! Corrected!**

- line 261: it seems that an adjective is missing: as become a (major, essential, important?) component of GOOS

**Ok! We have added “a major component”.**

- line 327: As it will be shown

**Ok! Corrected!, but most of grammar and style correctors suggest: “as will be shown in the following sections” and we have followed this.**

- Chapter 4.4: the term basin is repeated many times

**Ok! We have looked for alternatives in the new version.**

- Several times: “analyzed at the laboratory” or “analyzed in a laboratory”, I also saw just “at the lab”

**Ok, we have always used “analysed in the laboratory” (British English, although we are not sure about the journal’s preference).**

- Table 5, “AJACCIOI” is written instead of “AJACCIO”

**Ok! Corrected!**

- line 930: “because of the cut of funds” to “because of funding cuts”

**Ok! Corrected!**

- “Observation programm/platform/system” or “observing programm/platform/system” is inconsistently used over the manuscript

**In this case we have made just one correction. We use the word program when we refer to a set of the same type of devices handled by one single country. For instance, IEO in Spain has a program devoted to monitoring its waters with a periodic cruise. When we consider different programs, for instance, the repeated cruises plus the tide gauges and the moorings of a certain country, they constitute the Observation system of that country. If we consider the coordination of different programs and national (or institutional) programs, then we also have an observation system. Anyway, we also use them as synonyms in order not to repeat many times the same word.**

- The term “include” is heavily repeated in section 5.

**The reviewer is right. We have used some alternatives in the new version.**

- TAD number is 85 in the Abstract but 88 at line 458

**The right one is 88, which has to coincide with the data contained in the Excel file in supplementary material. Thanks for the correction!**