

Review of ‘Coastal HF radars in the Mediterranean: Applications in support of science priorities and societal needs’, by E. Reyes et al.

General Comments

The paper provides an excellent review of all the huge scientific progress achieved by the Mediterranean oceanographic community using data from HF Radars and clearly shows its increasing potential to develop oceanographic products and services with a high societal impact in the coastal areas.

The analysis of the capabilities of the HFR performed by the authors, including the SWOT analysis, and the derived set of recommendations is a necessary exercise to help the Mediterranean HFR community to further improve and promote the use of HFR data in scientific and societal applications.

The authors provide significant examples on how HFR has helped to advance on scientific questions and how they can improve numerical model performance and forecasts. However, showing some more concrete examples on operational applications could improve the manuscript. Could the authors provide, or highlight, more examples of ‘successful stories’ of applications of HFR products?

Also, can the authors better explain the concept of ‘regionalization’ (mentioned in Section 4 and then in the conclusion section)? does it mean that the derived recommendations are particular to the Mediterranean region or general for the global HF community?

Could the authors explain in a clearer way how this manuscript, especially the recommendations and conclusion section, is linked (and complements) the first part of the double contribution?

Specific Comments

All along the text, the ‘high spatio-temporal scales’ and ‘wide coastal areas’ provided by the HFR are mentioned, but readers not familiarized with HF technology may not know which scales and ranges the authors are referring to.

Section 2.1.1:

- The title refers to SAR incidents, but oil spill incidents are also mentioned in the text.
- A list of incidents for 5 countries and the HFR installations for those countries (except for Slovenia) is given, but there is no clear information on how the HFR data helped to support any of those incidents. Maybe a concrete example (successful story) of use of HFR in one incident could help. In the example given for the Northern Adriatic it is not clear if the HFR data has been used in the real incident or if it is an academic study.
- Figure 1 showing the location of radars and the areas where SAR incidents took place could be zoomed for the different countries to better see the location of the radars and their proximity to the incident’s location. That would also help to know if the area of the incidents were covered by the radars.
- Figure 2 and text in lines 236-239 are not very clear, what is the conclusion of this study? Forecast data is only reliable in areas with red colors in Figure 2?

Section 2.1.2

Section 2.1.2 (model assessment and improvement – including DA) and Section 2.1.3 (STP) are included under ‘maritime safety’ topic, but they are more general and could also be under topics 2.2 (extreme hazard) and 2.3 (environmental transport.).

Section 2.1.3

- It is not clear from the text if the use case described using SOM is being actually implemented operationally or if it is an academic study.
- Paragraph after line 425 reads more as a discussion on the use of STP algorithms rather than a concrete existing application of HFR data in Short Term Prediction algorithms.

Section 2.2.1

- I would recommend, for ease of reading to make a bullet point of the concrete examples of monitoring of extreme events described by the authors.
- I would recommend shortening the section by focusing more on the added value of the HFR data in detecting and monitoring extreme events response on oceanographic structures, it shouldn't be necessary to reproduce all the results which are already well described in the relevant literature.
- A figure (or a reference to an existing figure) illustrating the emplacement of the different HFR systems mentioned (e.g. HFR-TirLig, etc) would facilitate the reading.

Section 2.3.1

- An depth explanation of the lagrangian approach is included here, but the lagrangian approach has been already used before in the manuscript (f.ex in section 2.1 or 2.1.1). I would recommend avoiding the details of how lagrangian trajectories are computed (i.e. the methodology) and focus more on the added value of HFR in the pollution and floatable tracking and five concrete examples of applications.

Section 3

- The writing of this chapter needs some revision.
- Some important points in figure 17 showing the very detailed SWOT analysis are not reflected in the text in the Section, for example: the important Weakness/Threats detected on ‘Difficulties for addressing user engagement challenges’ or ‘Disconnection between academia with the private sector and policy-makers’ or ‘limited user uptake’ or ‘Fail in addressing the user needs’ deserve more attention in the discussion.
- Fig17: some bullet points require better redaction, e.g.:
 - ‘Risk that the effort will diminish or disappear’, which effort?
 - ‘Lower HFR operational as usual’, what ‘as usual’ means

Section 4

A set of 13 prospects/recommendations are given by the authors, but it's not clear what are the recommendations and what are the prospects: as it reads now the recommendations are spread all along the 13 points (e.g. ‘collaboration with international initiatives’ in c) and in m)) or repeated in 2 or

more points (e.g. 'creation of partnerships in points b) and k)). Could the authors perhaps group them by categories and specify what are the concrete recommendations to the HFR Mediterranean community?

The recommendations should also be better linked with the SWOT analysis, especially with the identified weakness and threats. For instance, recommendations on how to improve the long-term sustainability of the HFR network could be better stated (not only the short-term funding in grant calls mentioned in point l).

Section 5

The concept of 'regionalization' mentioned in L1098 is not very clear. What the authors mean here, the same as 'regionalization of the recommendations' (L929) or 'collaboration at regional level'?

Technical comments

Some parts of the manuscript need minor some revision. See below some examples.

L115: remove 'as described by several authors'

L117: should read 'installation' instead of 'implementation'

L122: what 'advanced' means here?

L135-137: needs a better formulation of the overall description of Section 4

L137: 'overcome' should read 'achieve'

L138: References to the UN Decade and the European Green deal may help readers not familiar with those initiatives.

L149: is it possible to add a reference to the oil spill incident in 2021 mentioned by the authors?

L150: 'it has once again been demonstrated': explain why 'once again', the reader not necessarily know all the background behind this sentence.

L164: typo in 'fate of the trajectory'

L211: Fig.1: better explain what 'HFR bounding box' is. There is a red square in the eastern Med which doesn't correspond with any country mentioned in the text.

L249: typo in 'Sirocco'

L280: not clear from the text what are the 'challenges associated with resolution'

L337: 'for a wide range of coastal stakeholder including Ports and environmental agencies'

L363: 'assimilated radial velocity observations'

L384/385: what could be the reasons for been the only operational example using HFR DA, is this discussed later in the text?

L440-443: the retrieval of wave and wind map, of high interest for sectors like offshore energy it is not under 'extreme hazard monitoring', please clarify why this sentence here.

L448: 'This work' refers to Berta et al. 2020? Not clear in the text

L468-469: 'adding to the analyzing' needs better redaction

L527: Typo in 'Sicily'

L561-562: it is not clear if the radar in the Gulf of Lyon is operating at 4.5MHz in the Mediterranean, while the example gives before (Sagres, Portugal) operates at 13Mhz. Not clear what is 'Stradivarious radar'? could you please clarify.

L565: 'As recently suggested by Domes et al., 2020...'

L583: can the authors provide some example or reference of 'sensitive ecosystems in the shallow water areas'

L587: 'strong tourist' must read '...strong tourism pressure'

L599: 'fast growth...' must read 'growing importance of HFR as a key...'

L759: 'reliability with respect to the actual sea dynamics', please further explain.

L776: should read 'is monitored weekly since 1984'

L785: must read 'Chlorophyll-a'

L851: should read 'decision-making in fisheries management'?

L859: 'inventory' to be replaced by 'compilation' or 'review'

L859-864: paragraph needs review

L879-891: paragraph needs review

L922-923: sentence is not very clear. What is mean here by 'European HFR network'? is this a stablished Network? In other part of the text 'HFR network' was referred to particular HFR installations in different regions.

L927: the end of the sentence is not clear: 'to ensure the integration.', 'integration' of what?

L928: should read 'HFR data and applications use'

L933: what the authors refer here by 'MONGOOS-HFR' Network? Is the same as the Mediterranean HFR Network?, or the Mediterranean HFR community is already organized around MONGOOS?

L941: what the authors mean here by 'regionalization of the observatories'?

L985: 'essential observing variables' meaning 'essential ocean variables'?

L945: 'Blue sectors' should read 'Blue economy sectors'?

L997: 'etc' should be removed or better placed.

L999: What does 'temporal analysis' mean here?

L1025: should read 'is the only regional model'

1050: should read 'efforts'

L1068: Do the authors refer here to 'European' or 'EuroGOOS' HFR Task Team?

L1077: should read '...ocean observing systems...'

L1079: what does 'advanced' means here? mature applications?

L1087-1090: This important sentence could be carefully reviewed: what are the 'services' referred here?
what 'technological development' means here?