In black: Referees comments and questions

In blue: authors responses

Referee #3:

The paper describes how the 11-year ENVISAT ASAR data were used to establish a database of oil slicks (both anthropogenic and natural origins) in the Gulf of Guinea, from which statistics for each country's EEZ and for the entire Gulf were obtained.

Overall, the writing is relatively clear, and the information is useful for monitoring and mitigating oil pollution. But before final publication I'd like to ask to authors to consider the following comments.

RC3-1 : The paper needs a thorough English proof reading. There are countless grammar errors, for example: "these oil slicks detected regroup" is awkward. Line 102: there is extra "ASAR". Line 106: "free-oil" should be "oil-free." There are others.

Correction done.

English proofreading of the article is in progress.

RC3-2 : Fig. 1. Are these EEZs labeled by number or by country in the database? For example, if we want to find EEZ for Togo, which is it on the map? Lat lon labels are too small to read, so are the notations. Also, what is the data source of these EEZs?

Figure 1 has been updated. The source of the EEZ is the Marine Regions. This information has been added to the map data source section. The names of the EEZ (ISO countries codes) have been added to the map.

RC3-3 : Line 98, there is this most recent one to add: Dong et al. (2022), chronic oiling in global oceans. It would be nice to compare the findings from these two studies for the Gulf in a follow-on study.

This interesting study has been added to the references. Authors compared the two studies and the findings are similar. In fact, the detected oil slick area per a "full-coverage observation" of the Gulf of Guinea is 574 km² in our study compared to 568 km² in Dong et al. (2022). Very interesting because we used different methods, different data and also different periods of time.

This comparison has been added to the article.

RC3-4 : Fig. 4. What date? What location? What length scale? How is it stretched? Where is the platform?

Correction done.

RC3-5 : Line 138 – 155. This description is good, but please some examples to show how these different forms are differentiated. How is the boundary of each slick extracted manually? By drawing the boundary with a steady hand? If so, show examples of the original images and the manually drawn boundaries.

Correction done.

RC3-6 : Line 159, what is "photo-interpretation"? This is no photo used in the study, right? I suppose you wanted to say "image-interpretation", correct? There are several other places with the same word.

Correction done.

RC3-7 : Line 159 – 164. This normalization is very good.

Thank you Sir.

RC3-8 : Eqs. 4-5: what is GG?

GG=Gulf of Guinea. Correction done.

RC3-9 : Line 202 – 2016. I couldn't find how slicks due to ships, platforms, oil seeps are differentiated manually.

To detect and differentiate the three types of oil slicks authors proceeded by 3 steps:

- categorization of the detected oil slicks performed according to an interpretation based on morphological and textural criteria
- multi-date analysis to assess repetitive slicks
- validation using auxiliary data (oil platforms locations, oil and gas fields, bathymetry, marine traffic, geological, etc)

These clarifications have been added to the article.

The authors improved the article by adding some examples of interpreted oil slicks.

RC3-10 : Fig. 5. It's better to show the image itself, and then have a call-out box to show the oil platforms with yellow dots.

Correction done.

RC3-11 : Figs. 7 – 9: What does density mean? For example, if a location has a number of 200, what does it mean?

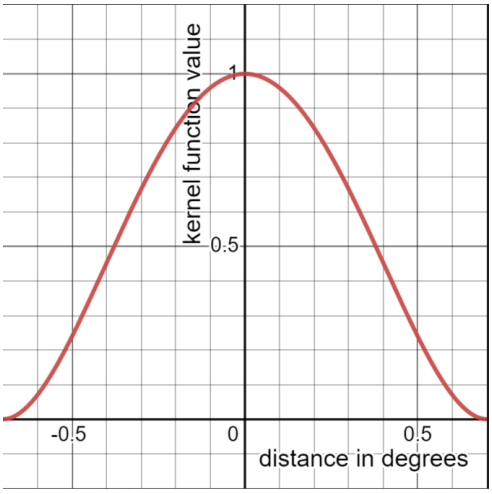
For each of the N slicks, a point has been designated as the source, forming a discrete dot map. In order to obtain a continuous density map, each source point of this dot map has been convoluted by a 2-D kernel function. The density map shown in fig .7, fig .8 and fig .9 is the sum of each of these N kernel functions.

The kernel function that has been used is:

$K(r)=(1-(r/0.7)^2)^2$ if $r<=0.7$

$K(r)=0$ if $r>0.7°$

where r is the euclidian distance to the source point in degrees



with a support [-0.7,0.7]

These clarifications have been added to the article.

RC3-1 : Fig. 10. This is an important figure. Can we interpret the values as, for a given year, if there is just 1 huge image covering the entire EEZ, the value represents the oil slick area from this imaginary image? I think this is what "normalization" means.

This is exact regarding the order of magnitude of each of these three origins. It's the equivalent of the "Normalised oil slick area in km²" in Dong et al. (2022). We have added a table giving the temporal mean area covered in oil in the Gulf of Guinea between 2002 and 2012 to allow the comparison between our study and that of Dong et al. (2022).

RC3-1 : Fig. 10. What caused the sudden drop in ship-induced oil spill after 2008?

As explained in the article, we assume it was a consequence of global crisis of 2008.

RC3-1 : Figs. 11 & 12. All fonts need to be enlarged. Also, it's better to use a different y-axis range for different regions so the annual variations can be seen. Same for Figs. 13 & 14.

The figures have been enlarged. As for the y-axis range, the authors aim to compare pollution between different countries/EEZs. Setting the y-axis to different ranges would make this goal difficult for readers to grasp.