

## **General comments**

As reviewer, I recognize the quality of the work undertaken to realize a topo-bathymetric DEM in such a complex environment. I am particularly attentive to actions related to the tedious work of digitizing charts, plus all the detailed work done to properly take into account the different vertical datums and above all the innovative way of getting elevations from the flood exceedance method. The reviewer appreciate that you illustrate the inter-relation between these datums as it brings forward to the mind of the reader this issue in terms of vertical accuracy of your data product.

## **Specific comments**

Line 113:As many planar interpolation tools are existing to grid point cloud data, could you please further detail why you have selected the topo-to-raster algorithm (general principle, pros and cons of this algorithm).

Section 2.2: We suggest a schema to better describe your methodology and make it easy for the reader to understand it.

Figure 3.a I believe the color ramp is not fully appropriated to what you want to describe. Indeed you are using a divergent color map centered close to 50%. It would be preferable to use a sequentially progressing color map (like blue to red, or light yellow to brown, without going through white). Few comments on the analysis of this map: I do not understand the strong boundary between dark blue and yellow (SSW of the map). Also, it is my understanding that flood exceedance should be high close to the border of the river (banks, coast) and small far away from it (where the altitude is higher). It does appear to be the opposite from your map. Please comment or correct. If this a poor interpretation from me, please help me (and other readers) not get confused and/or better understand your methodology and how to interpret this map.

Section 2.3.3. This section seems to indicate that a 2D representation of the WSE would be welcome.

GEBCO: GEBCO is mainly originating from Hydrographic Offices data. These organizations tend to provide bathymetric data relative to local "Chart Datum" which can be roughly estimated to be equivalent to the Lowest Astronomical Tide. While in deep ocean (main objective of this DTM) Lowest Astronomical Tide (LAT) and Mean Sea Level (MSL) can be safely assimilated to be convergent, it is not the case in coastal waters. To my knowledge, no vertical shifting consideration from CD to MSL has been taken into account in the overall GEBCO production. This should be considered as a serious limitation having major consequences on the vertical precision of the bathymetric DTM.

Another important point to consider with GEBCO is that it is a composite DEM with multiple sources of different intrinsic horizontal and vertical resolution. Locally, using the TID (accompanying grid) we can see that bathymetric information in the GEBCO grid are originating from "interpolated based on a computer algorithm" but we do not have any more details on the underlying data and their characteristics (density, vertical and horizontal accuracy). Hence, it is not fully advised to rely on the transition between land and sea from GEBCO.

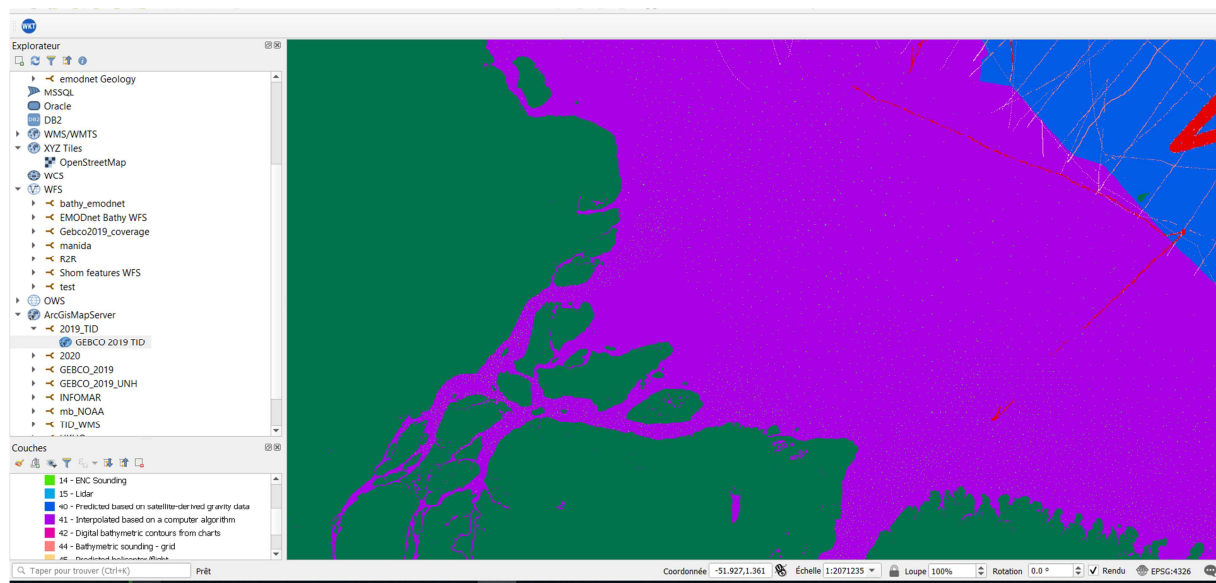


Figure 4: Here again I believe the color-ramp is not adequately chosen (gray at 4m can be easily confused with cyan at -1m) prefer here also a sequential color-ramp.

Figure 6. Please indicate the vertical reference in the legend. Also note that as Bed elevation and Terrain elevation should have a complementary color bar while they seem to intersect between 0 and -1m

Conclusion/Caveat: I would have preferred a more detailed discussion section rather than a “caveat section” in the Conclusion. However, I recognize the rigorous and “ethical” state of mind of the authors in stating the limitations of their data product.

May I also suggest to the authors to:

- undertake a simple slope or shading (in different orientation) which may highlight some artefacts or poor discontinuities in their model
- provide a mask indicating where the is the limit of your DEM, with the level of accuracy you describe in your paper. Moreover, I would suggest providing an associated grid describing the origin of each nodes of your DEM (like the TID concept for the GEBCO grid).

May I also suggest the following reading:

[1] P. Weatherall et al., “A new digital bathymetric model of the world’s oceans,” *Earth Sp. Sci.*, vol. 2, no. 8, pp. 331–345, Aug. 2015.

[1] C. J. Amante and B. W. Eakins, "Accuracy of Interpolated Bathymetry in Digital Elevation Models," *J. Coast. Res.*, vol. 76, pp. 123–133, 2016.