PAEWG-03-05

3rd Meeting of the Protected Areas and Ecosystems Working Group (PAEWG2)

01-03 March 2021

SIOFA Fishing Footprint

Relates to agenda item: 7 Working paper ☒ Info paper ☐

SIOFA Secretariat

Abstract

The Scientific Committee requested the SIOFA Secretariat to prepare specific map of the spatial distribution of effort to develop an appropriate SIOFA fishing footprint (SFFP). Several SFFP were presented last year based upon the catch and effort data submitted to the Secretariat.

No clear guidance from the MoP was given to the SC in regards of the objective and definition of the SFFP. The data and the methodology have been chosen by the PAEWG and applied to produce several new footprints. It highlights that when CCP did not provide fine scale data, their fishing footprint is excluded from the SFFP.

Recommendations *(working papers only)*

1. The Secretariat propose the PAEWG/SC to discuss the material and methods.
2. The Secretariat recommends the SC to provide the MoP with a footprint map that would be at least a starting point to define the historical spatial extension of the SIOFA fisheries.

Contents

A. Introduction

SIOFA CMM 2019/01 para 7 request (amongst others) the following:

> "*The Scientific Committee shall, by no later than the close of the ordinary meeting of the Scientific Committee in 2020, and thereafter whenever a substantial change to the fishery has occurred or new data has otherwise been provided to the Scientific Committee warranting changes, develop and provide advice and recommendations to the Meeting of the Parties on*
> *- an appropriate SIOFA bottom fishing footprint based on the data provided by CCPs to the Secretariat under paragraph 20.*"

SIOFA CMM 2019/01 para 20a requests:

> *"CCPs shall, at least 30 days prior to the commencement of the ordinary meeting of the Scientific Committee in 2018, submit to the Secretariat (a) relevant data on the spatial extent of its historical bottom fishing effort in the Agreement Area expressed as grid blocks of at least 20 minutes resolution or, if available, a finer scale […]".*

Very few CCP provided relevant and usable data in relation to this requirement, but the CCP historical catch and effort data provide with what is necessary to establish the historical bottom fishing footprint as long as the requirements of the CMM on data standards are respected.

SC4 request the SIOFA Secretariat to prepare specific map of the spatial distribution of effort to develop an appropriate SIOFA fishing footprint (SFFP). Several SFFP were presented at SC5. The works and map previously done for SC5 are available on the SC5 meeting pages or on request to the SIOFA Secretariat.

Following this, SC5 requested the MoP to provide information on the usage of the SFFP to help in selecting the most appropriate SFFP. Unfortunately, the MoP did not provide with additional information and let the SC6 to deal with this subject.

PAEWG chair opted that the SFFP should be built only with the data provided at fine resolution (up to 20-minutes degree resolution) and uses a 20-minutes resolution grid. Fishing footprint for each CCP should also be prepared so each CCP can clearly see the resulting extension of its historical fishing, it highlights that that when fine data is not provided, that data is excluded from the footprint. CMM 2019/02 on data standard requests CCPs to provide data on a haul-by-haul basis.

B. Data Material

B.1. Database

The data that have been used to produce these draft fishing footprints come from 2 databases that are currently maintained at SIOFA Secretariat:

1. The haul-by-haul catch and effort database. It contains fine level catch and effort data on a haul-by-haul basis, i.e., every haul has its own date/time and a position.
2. The aggregate catch and effort database. It contains various level of aggregation of catch and effort data when CCPs fail to provide data on a haul-by-haul basis (e.g., when hauls are provided with an accuracy of one degree, or multiple hauls have been merged into one day or one place, etc.).

B.2. Data period

Historical fishing events data up to year 2015 (included) have been extracted from the database and used.
Notes: CCPs without historical fishing activities in the SIOFA area (before 2015) are therefore not considered. it is the case of **Comoros**.

B.3. Data accuracy

Only data provided with a geographical accuracy up to 20-minutes have been selected and used. Therefore, historical data that have been provided at a coarser resolution are not considered (data provided with an accuracy of 30 minutes, 1 degree and above are excluded from the process).
Notes:

- Historical activities from **Japan** and **Thailand** does not fit the selection criteria and could not be included (data provided at 30' or 1° resolution)
- No fishing data from **Korea** could be used because it is provided only on a FAO-area level
- No fishing data from **China** could be used because no spatial information are available.

B.4. Gear selection

Only gears which may have contact with the sea floor have been used: trawls (mid-water, bottom and other trawls), longlines (exclusion of drifting and pelagic longlines), handline, traps and pots.

Note: CCP who did not provided data to the Secretariat could not be considered in the footprint. This is the case for **Mauritius**.

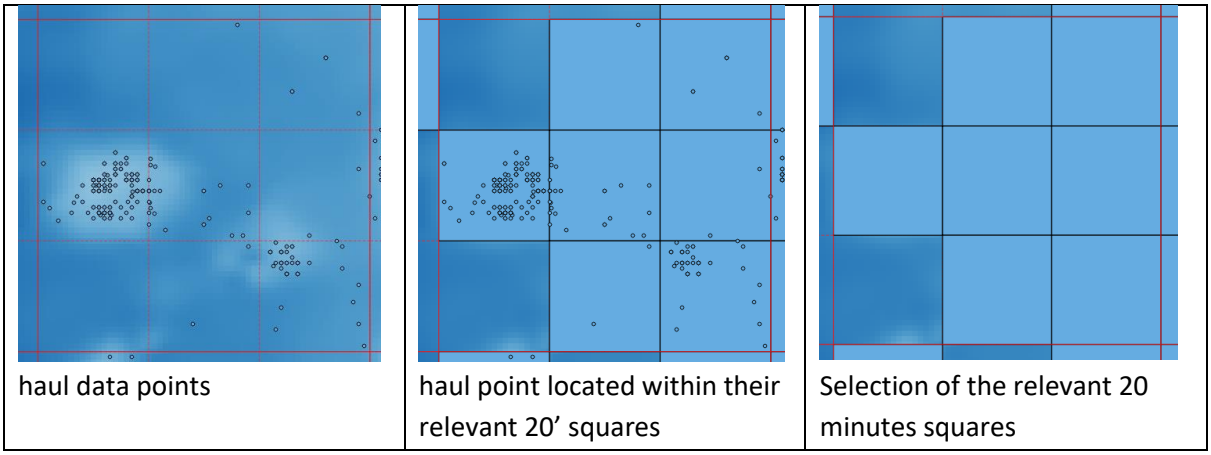
C. Methods

Data have been imported into qGIS (Quantum Geographic Information System software) to perform the spatial processing. Imported data show as a points layer in the GIS software.

Geoprocessing

A **20-minutes square grid** has been used to project the fishing events points.

The 20-min square are extracted from the full grid where at least on fishing event is in or at the edge of a 20-min cell. Using 20-minutes squares also prevent the disclosure of sensitive fishing grounds information.
See the process illustrated in figure 1.



haul data points	haul point located within their relevant 20' squares	Selection of the relevant 20 minutes squares

Figure 1: fine resolution fishing activity points turned into 20' squares.

Depth threshold

An arbitrary depth threshold of 2000 m have been tested to exclude deeper areas from the fishing footprint.
The depth dataset come from the ETOPO1 Global Relief Model from NOAA. The resolution of this model is one arcminute. The areas above -2000 m have been calculated thanks to qGIS Raster Tools and has been intersected to map the above -2000m only footprints.

D. Result

4 sets of maps have been generated to display several footprints:
- Set I: fishing footprints by CCP
- Set II: fishing footprints by main gear (TW-trawl, LI-lines and OTH-others)
- Set III: complete SIOFA fishing footprint at 20' grid resolution from fine resolution data (Maps I)
- Set IV: complete SFFP excluding deeper areas.

Note: Annex I present a footprint at 1° resolution that has was produced last year for SC5. It takes into consideration coarser resolution data up to 1-degree accuracy. Therefore, it adds the fishing activities from Japan and Thailand.

D.1. Fishing footprint by CCP

Australia

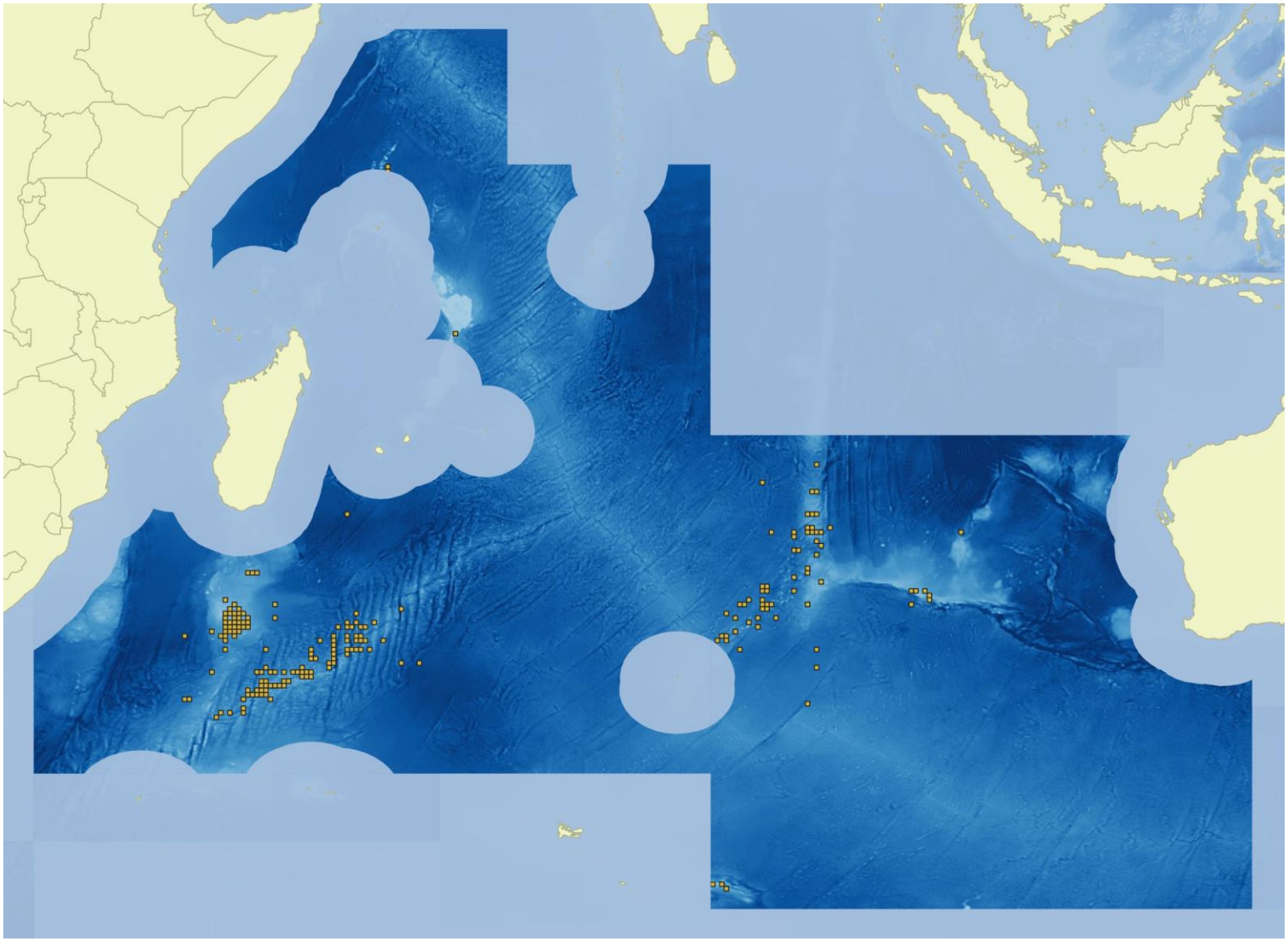


Figure 2: Australia historical fishing footprint at 20-minutes resolution.

Cook Islands

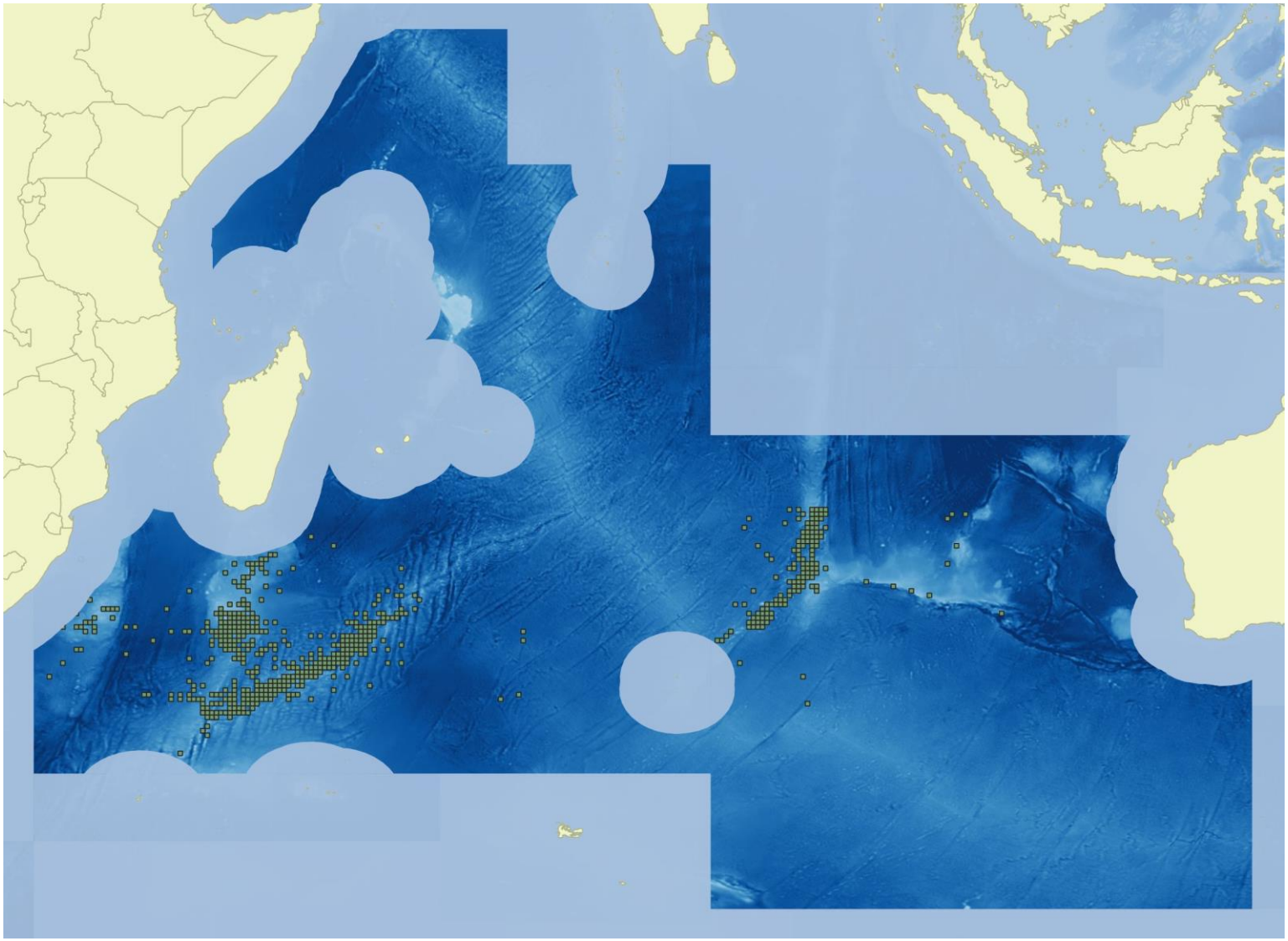


Figure 3: Cook Islands historical fishing footprint at 20-minutes resolution.

European Union (France and Spain)

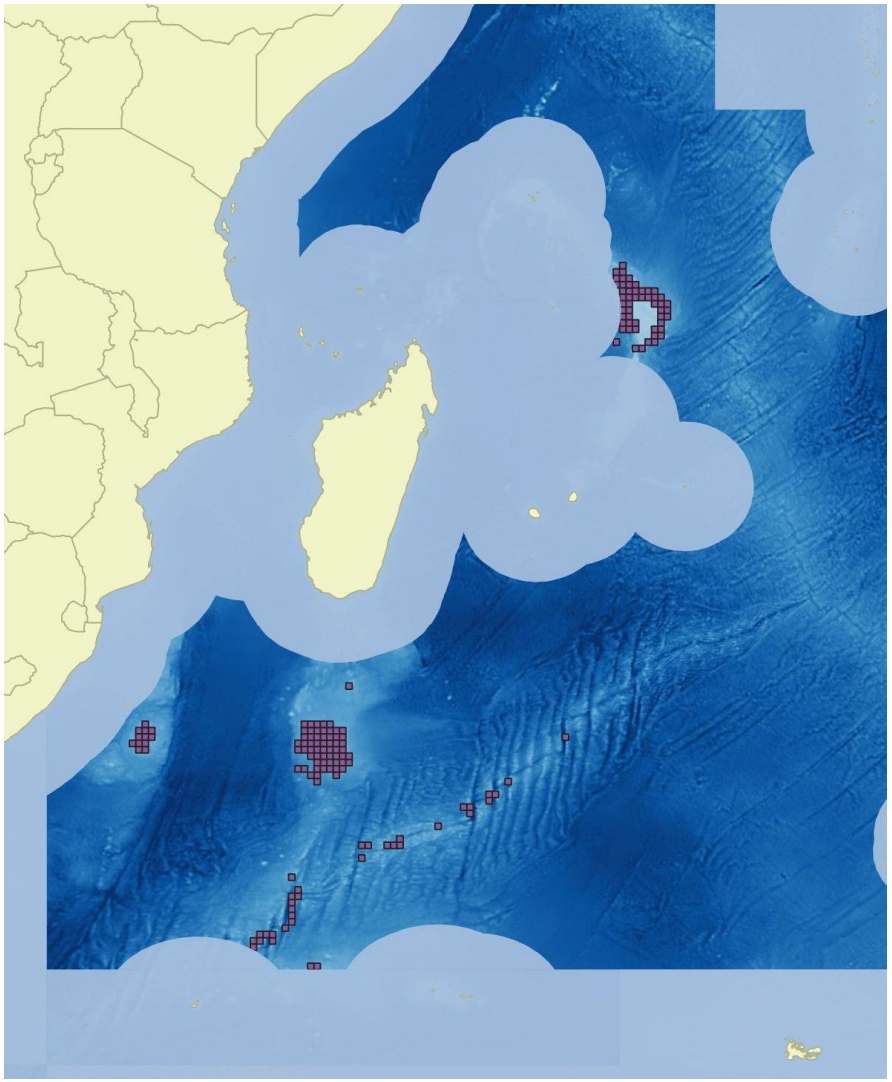


Figure 4: European Union historical fishing footprint at 20-minutes resolution.

France Overseas Territories

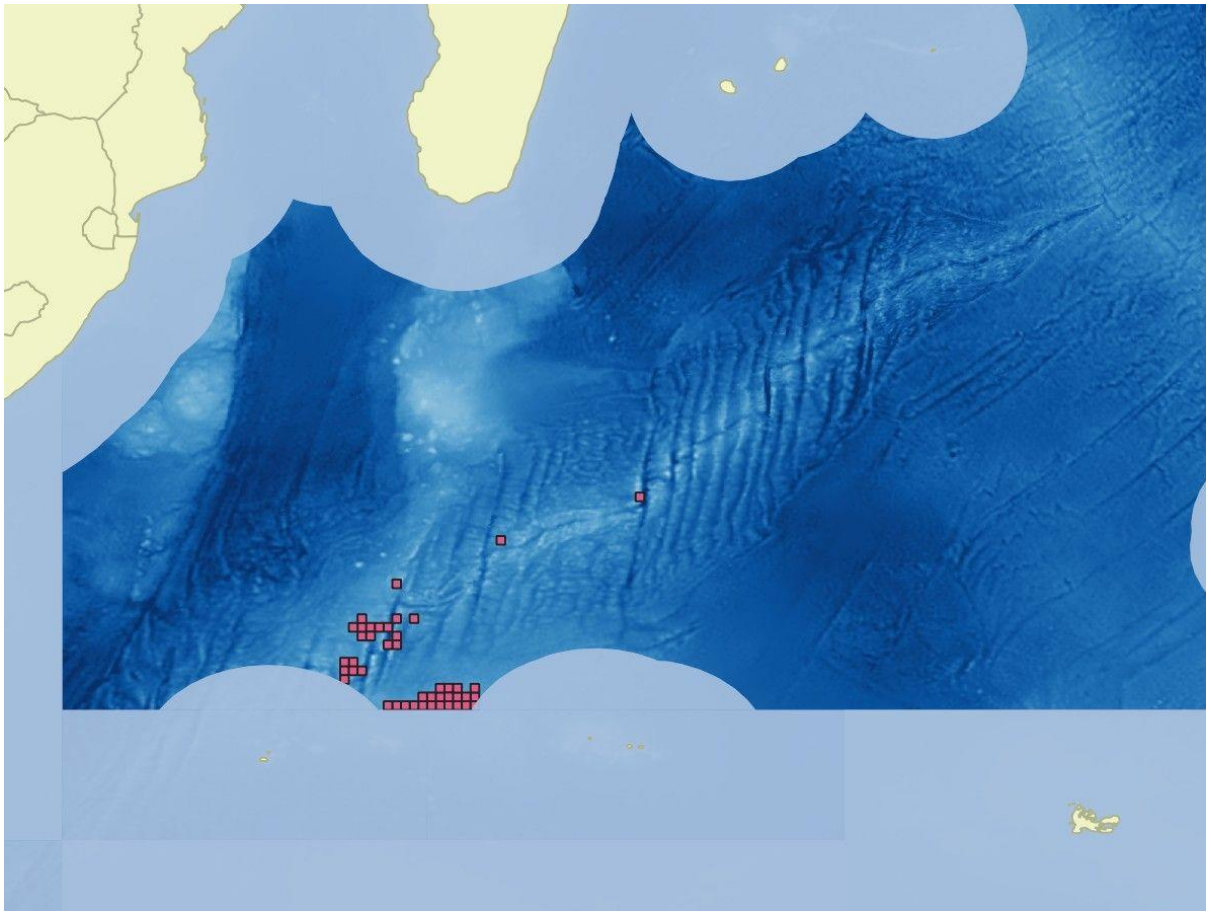


Figure 5: France (Overseas Territories) historical fishing footprint at 20-minutes resolution.

D2. Fishing footprints by main gears

Trawl gears (Midwater and Bottom trawls)

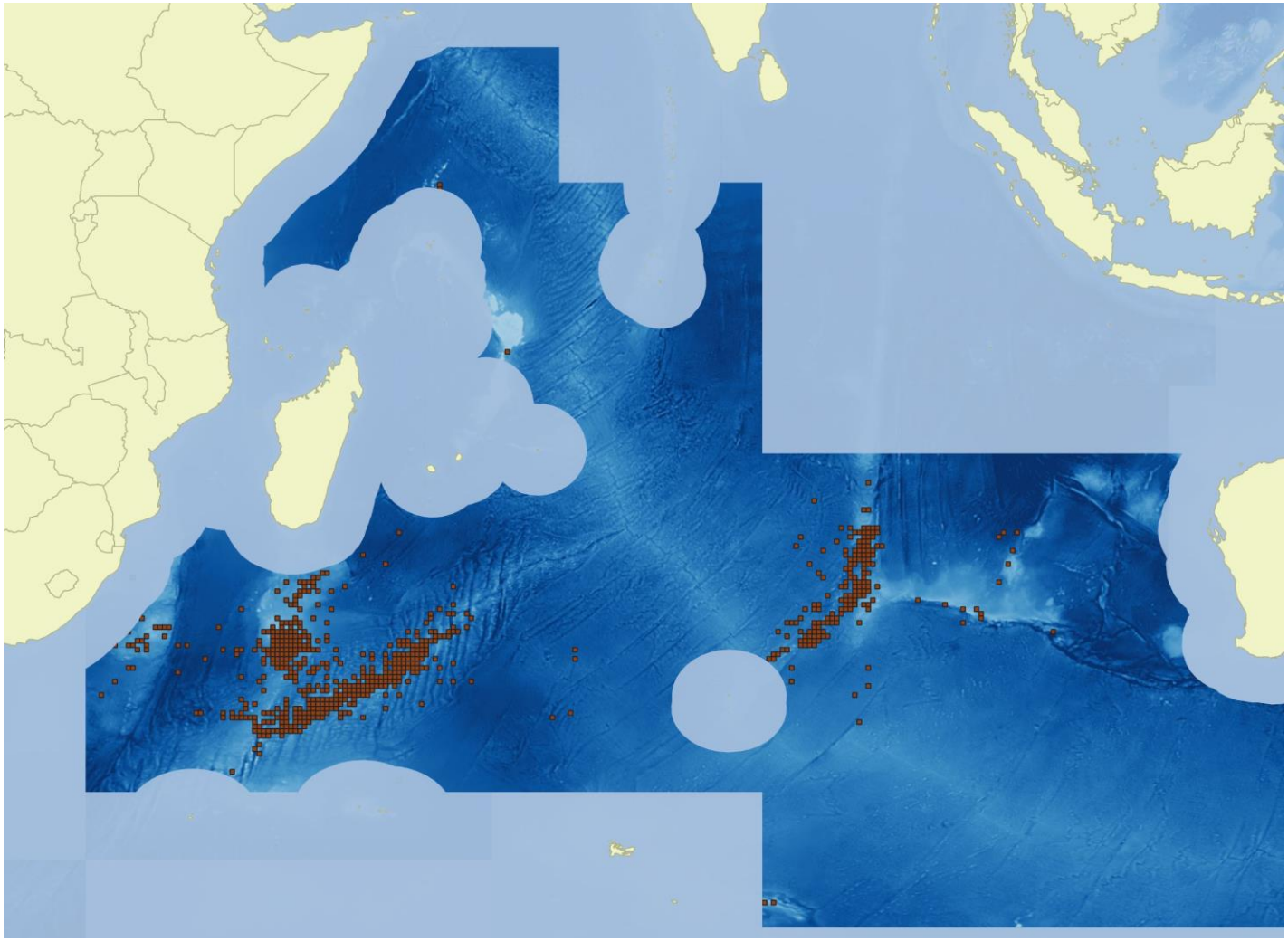


Figure 6: historical footprint of trawls gears at 20-minutes resolution

Line gears (Longline, vertical line and handline)

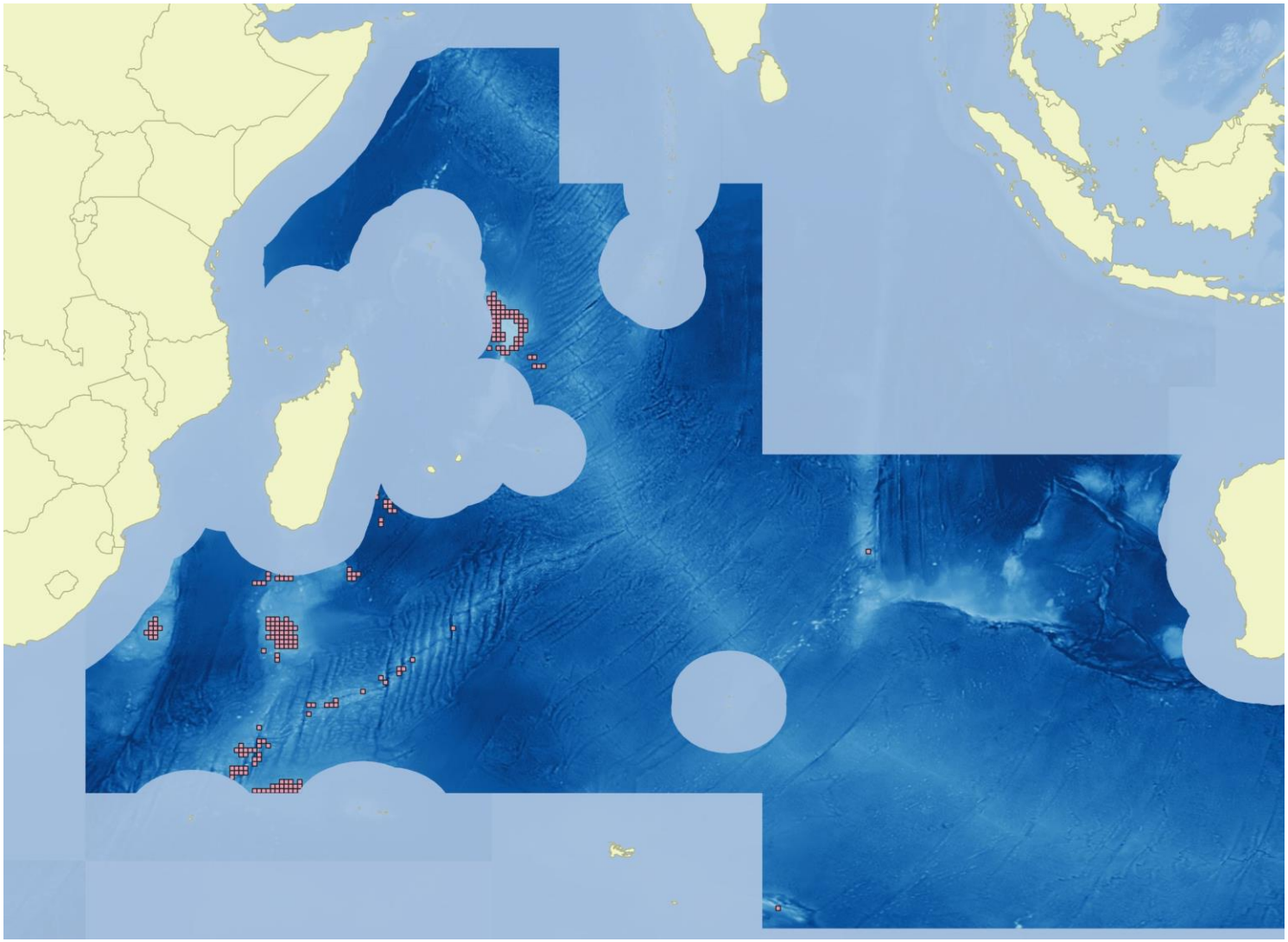


Figure 7: historical footprint of line gears at 20-minutes resolution

Other gears (traps, pots, nets, etc.)

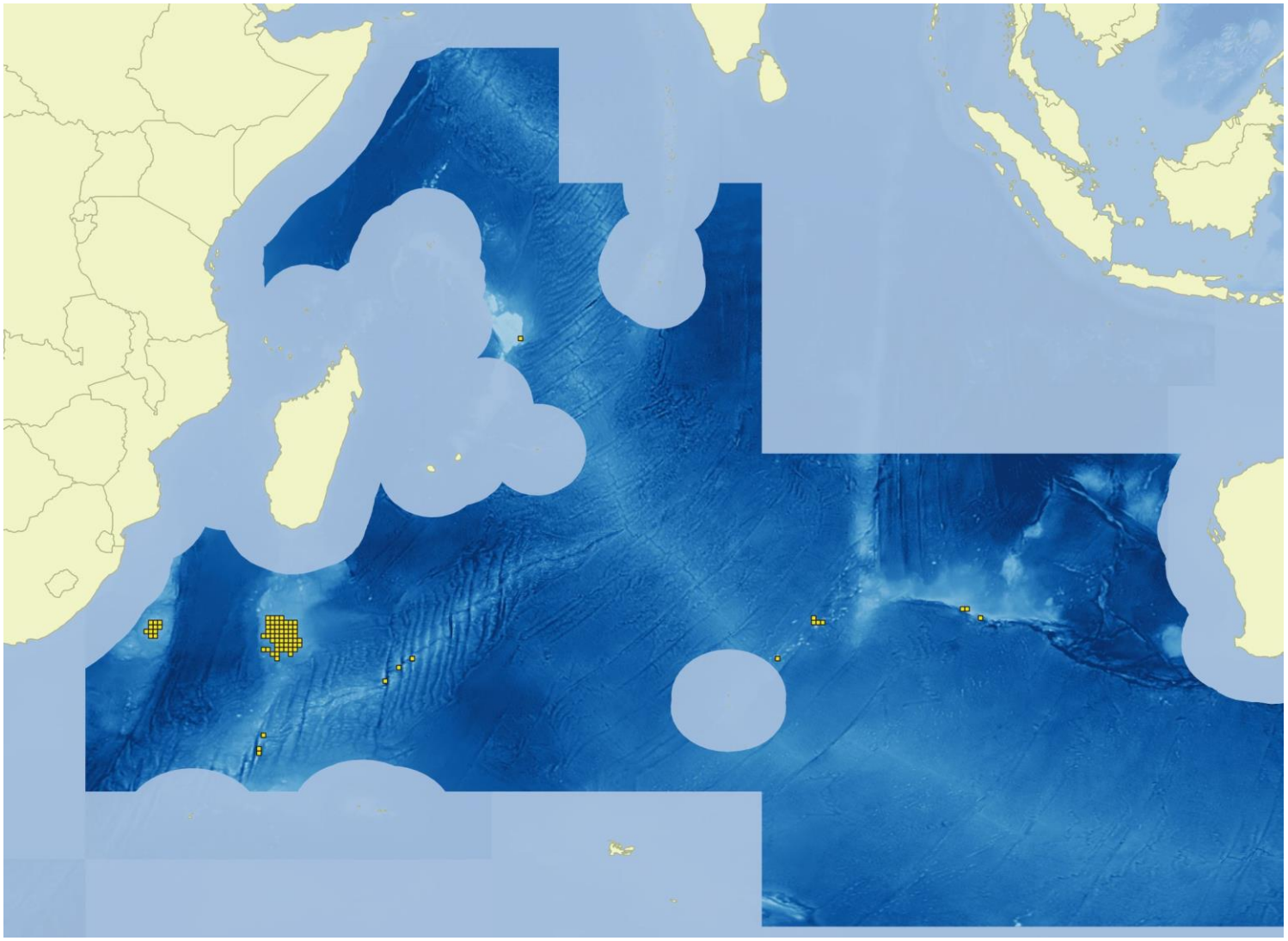


Figure 8: Historical fishing footprint from all other bottom gears at 20 minutes resolution

D3. Fishing footprint from all fine resolution data

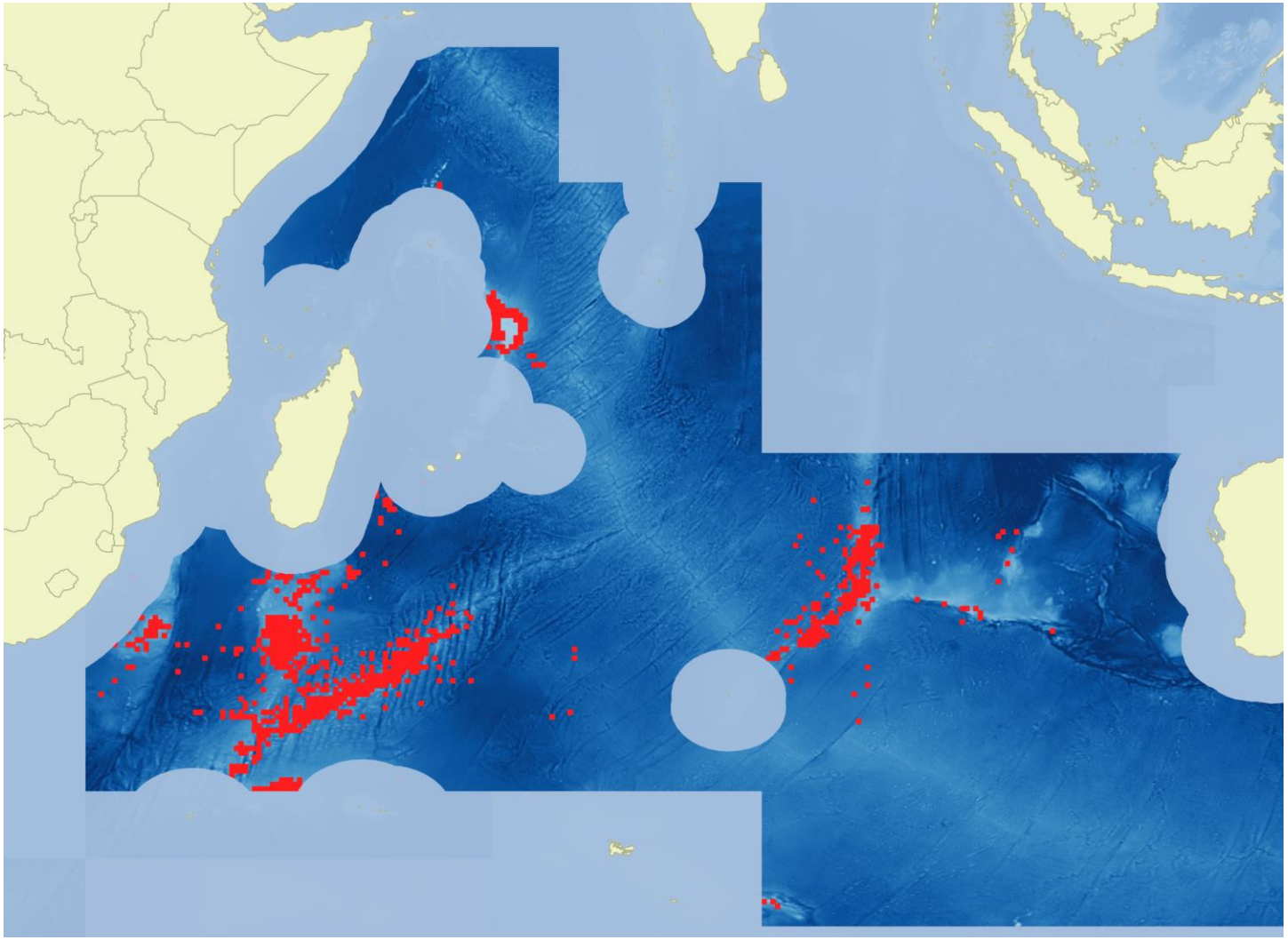


Figure 9: Historical fishing footprint at 20 minutes resolution from all fine level data

D4. Fishing footprint from all fine resolution data after application of the 2000 depth exclusion layer.

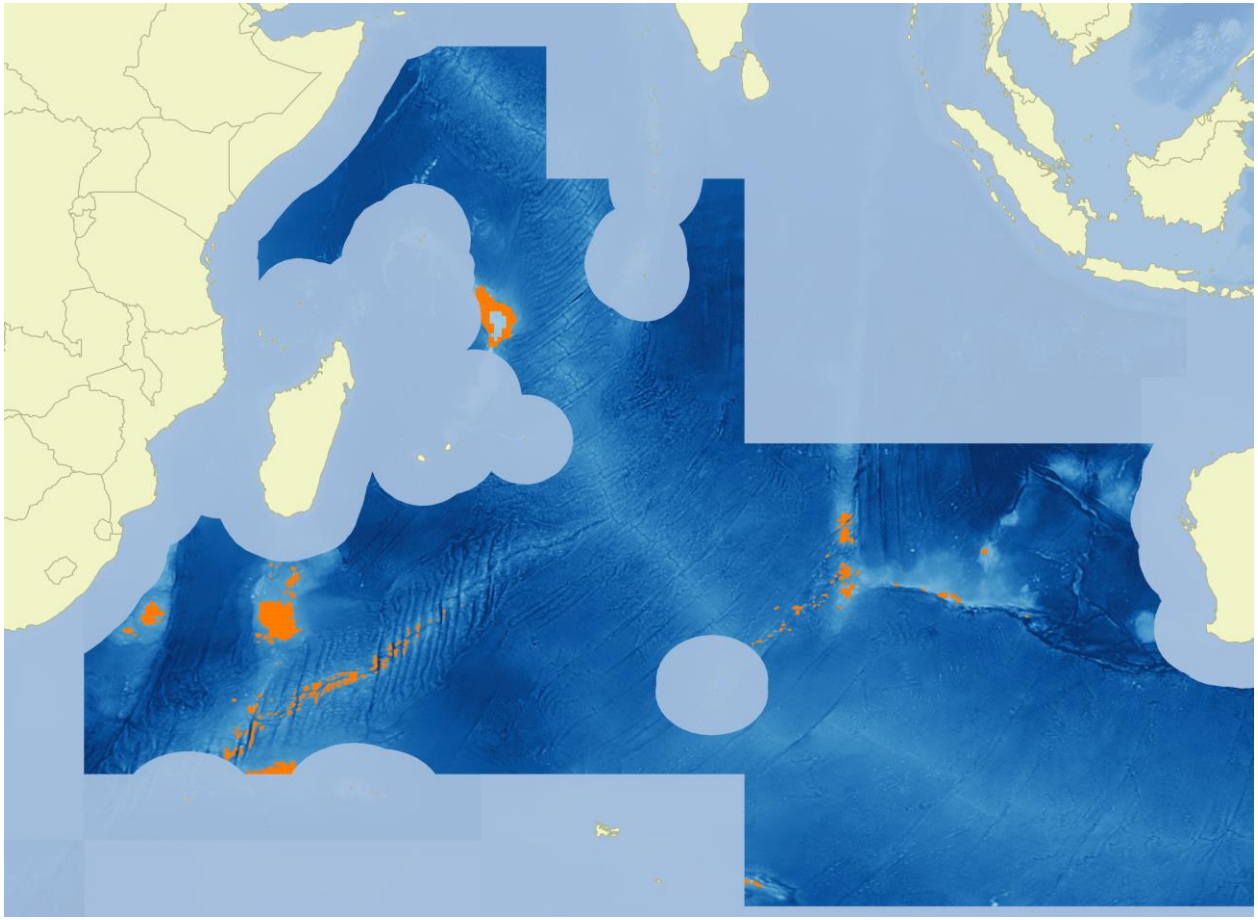


Figure 10: SIOFA historical fishing footprint at 20-minutes resolution where depth is above 2000 m.

Note that the 2000m depth exclusion removed several areas out of the footprint. The resolution of the seafloor bathymetry model is 1 minute, it can explain the removal of several area where a few seamounts are ignored, because they are too small to raise the mean depth of their respective 1-min cell above 2000m.

D. Discussion and conclusion

These maps of footprints result from the proposed methodologies. Many other methods and variables can be chosen and added to obtain other footprint outputs. The advice from the Scientific Committee is expected to enhance these footprints.

The above maps encompass a maximum of the available data that has been provided to Secretariat. However, some CCP activities are not taken into consideration (and do not show) either because of loss of historical, lack of data accuracy or non-compliance with the SIOFA fisheries data submission requirement.

The final objective is to obtain an historical fishing footprint ready to be used by the Meeting of the Parties to complement its decision making. The footprints proposed here should be presented to the MoP as a basis for further advices and recommendations.

ANNEX I: Historical fishing footprint at 1-degree resolution

This map tests the inclusion of coarser resolution (above 20-minutes) data into a 1-degree resolution footprint map. It allows to consider activities from CCP where fine data is not available.

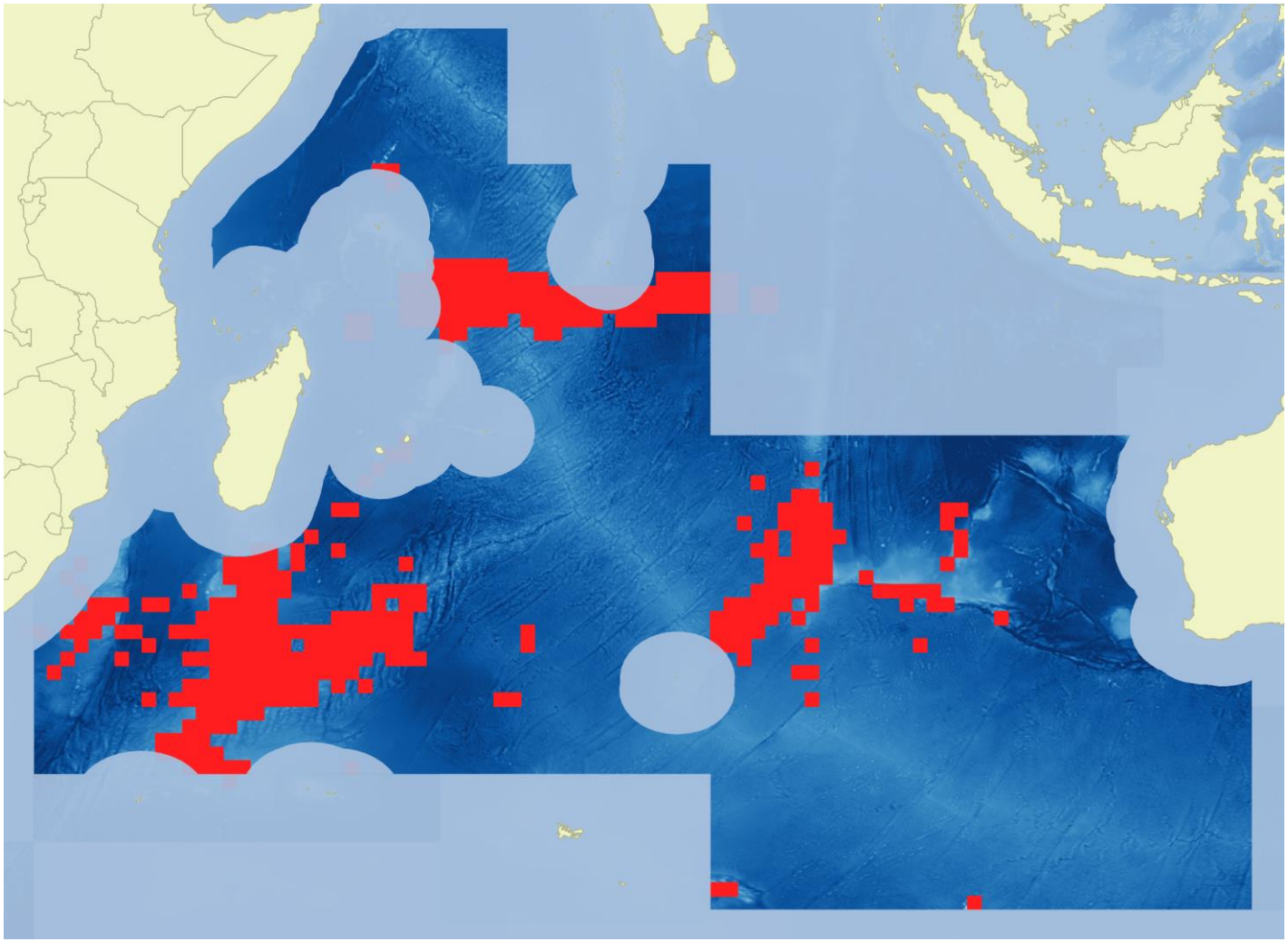


Figure 11: Historical fishing footprint at 1-deg resolution from fine and coarse resolution data