

Meeting: 9th SSN / LRIT Group Meeting

Place and date: Videoconferencing, 25 May 2021

Agenda item: MARES recent developments on AIS coverage monitoring

Document number: SSN/LRIT 9.6.3

Submitted by Italy

Summary	The document presents the AIS coverage monitoring tool, developed by Italy and introduced within the MAREΣ region.
Action to be taken	As per paragraph 3.
Related documents	a. 17 th Mediterranean AIS EWG (27.10.2020) meeting report; b. 5th EMSA/ Italy/ Norway meeting on AIS Regional Servers (12.01.2021) meeting report.

1 Background

At the 17th Mediterranean AIS Expert Working Group (EWG) meeting (27th October 2020), Italy presented the MAREΣ general activities (document MAREΣ 17/5/1), including the implementation of the AIS coverage tool estimating the AIS coverage within the MAREΣ region. Italy was invited to present this tool to the SSN group.

2 Current Status

2.1 The coverage analysing tool

The “AIS coverage analyser” was developed in MAREΣ on 12th October 2020. The software exploits AIS data received from the Italian AIS NPR and MAREΣ systems and can determine the AIS radioelectric coverage. The tool utilizes the T-AIS data provided to MAREΣ by each participating Country and potentially by each AIS Base Station (if this information is available in the comment block associated to each VDM string delivered by the participants Countries). The system administrator of each participating Country can decide whether to include this coverage information in the comment block.

The calculated AIS coverage can be provided to users in three different ways: via the GIS, via the AIS stream, and via the Web Map Server. Through a dedicate Web Map Service, MAREΣ is able to provide the coverage layers also to external users (through M2M connection).

The method applied involves the creation of a grid composed by cells of fixed size, to determine, in a given time period: the total number of AIS tracks received in the cell; the number of AIS track received for the first time in the cell (born in the cell); the number of AIS track last received in the cell (death in the cell). The coverage is estimated for the following time periods: 1 hour, 12 hours, 1 day, 1 week and 1 month.

The tool makes coverage estimation according to Isenor- Lapinski method by calculating, in the area of interest, a coverage index from 0 to 1, whereby 1 means that a ship in the position under consideration has a

100% probability of being received by the T-AIS networks. For each cell, it is possible to check the coverage index expressed in percentage and calculated for three different quality values: 30 seconds, 4 minutes and 10 minutes, as presented in Figure 1.

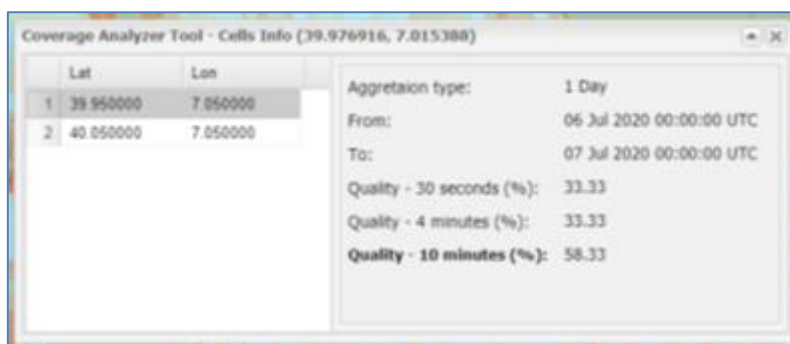


Fig.1: The coverage index calculation monitoring

Three different types of AIS coverage are calculated:

- A short-term AIS coverage - is calculated twice a day, using AIS information received 12 hours before the time set by the Administrator;
- A medium term AIS coverage - is calculated once a week, using AIS information received in the previous seven days;
- A long-term AIS coverage - is calculated once a month, using AIS information received in the previous month (calculated over 30 days).

The above layers of short, medium and long-term AIS coverage are visualized on the MAREΣ GIS by a special color scale allowing users to get the immediate perception of the probability of receiving AIS information from a ship located in the area of interest. Example is presented in Figure 2.

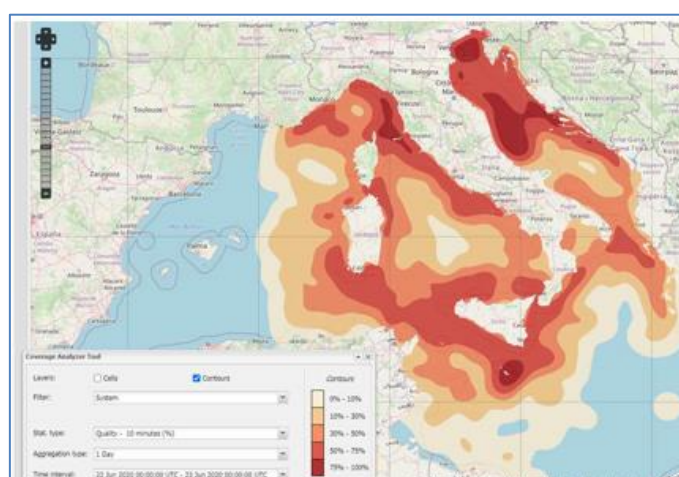


Fig.2: A colour scale indicating the signals reception probability

The Coverage analyzer software also calculates the quality of coverage of specific AIS Base Stations or Core Users, as presented in Figure 3.

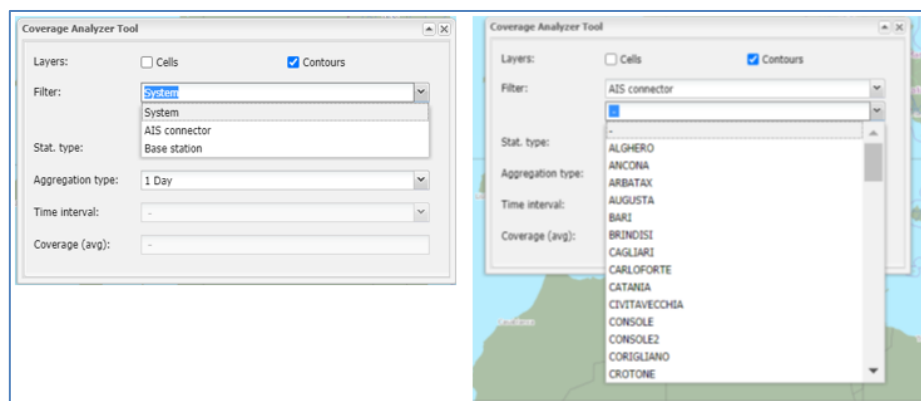


Fig.3: The coverage monitoring page

An example of coverage guaranteed by a Core User is presented in Figure 4, where coverage of data received from three Base Stations is presented on the left side and the coverage estimated from one Base Station is presented on the right side.

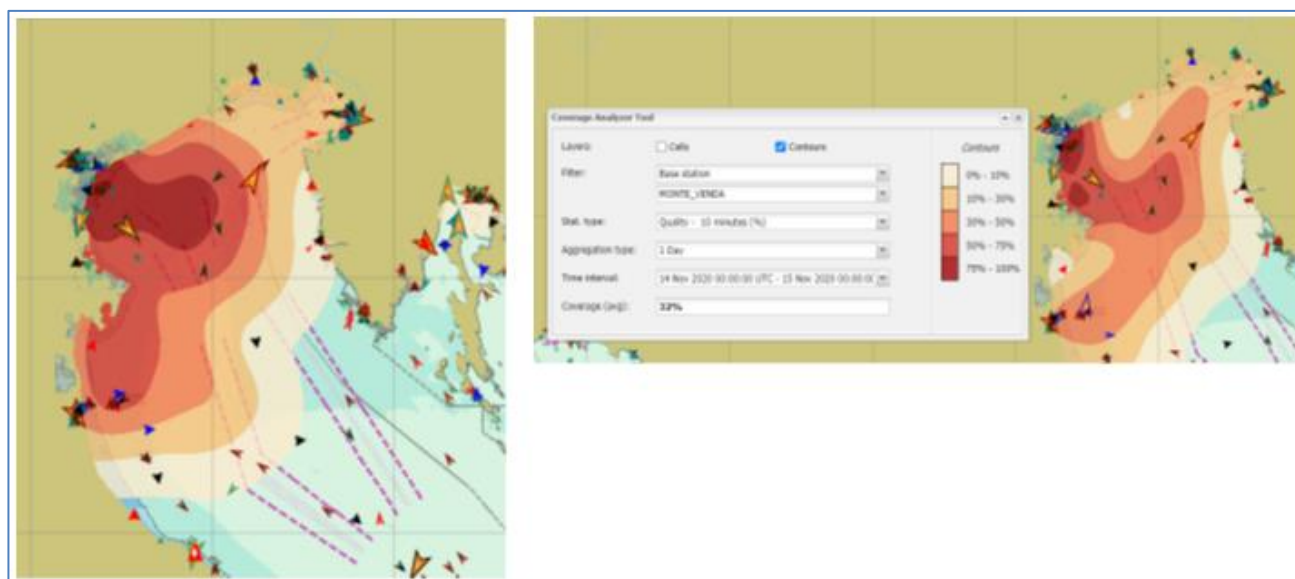


Fig.4: Differences in coverage by one and three BSs

2.2 Additional developments

A new provider (ITA_DATALINK) was recently added to MAREΣ, providing AIS information acquired by five Coast Guard naval units equipped with a device called “Data Link”. This provider enables to transmit the AIS information acquired by these vessels through an IP satellite connection. Currently this information is only visualized on the MAREΣ GIS and is not delivered to EMSA or other MAREΣ participating Countries through

the AIS streams. Tests to assess the estimated coverage assured by a ICG vessels were started on 23 March 2021. Some of the testing results are showed in Figure 5.

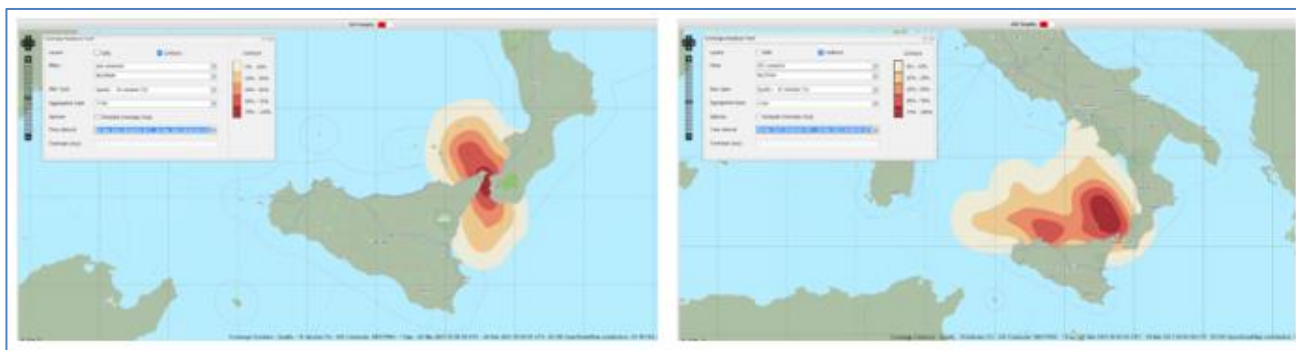


Fig. 5: Results of the Data link testing

2.3 Coverage assessment in the MAREΣ Region

At the 5th EMSA/ Italy/ Norway meeting on regional AIS servers (held online on 12.01.2021) the participants discussed several issues related to AIS data exchange, including a non-realistic coverage for some networks observed during the summer period. The participants agreed to conduct joined evaluations of the coverage, using the new MAREΣ AIS coverage monitoring tool.

3 Actions required

Member States are invited to take note of the above information. Examples of the coverage calculated for MAREΣ Member States are presented in the Annex.

Annex

Examples of calculations made by the coverage analysing tool

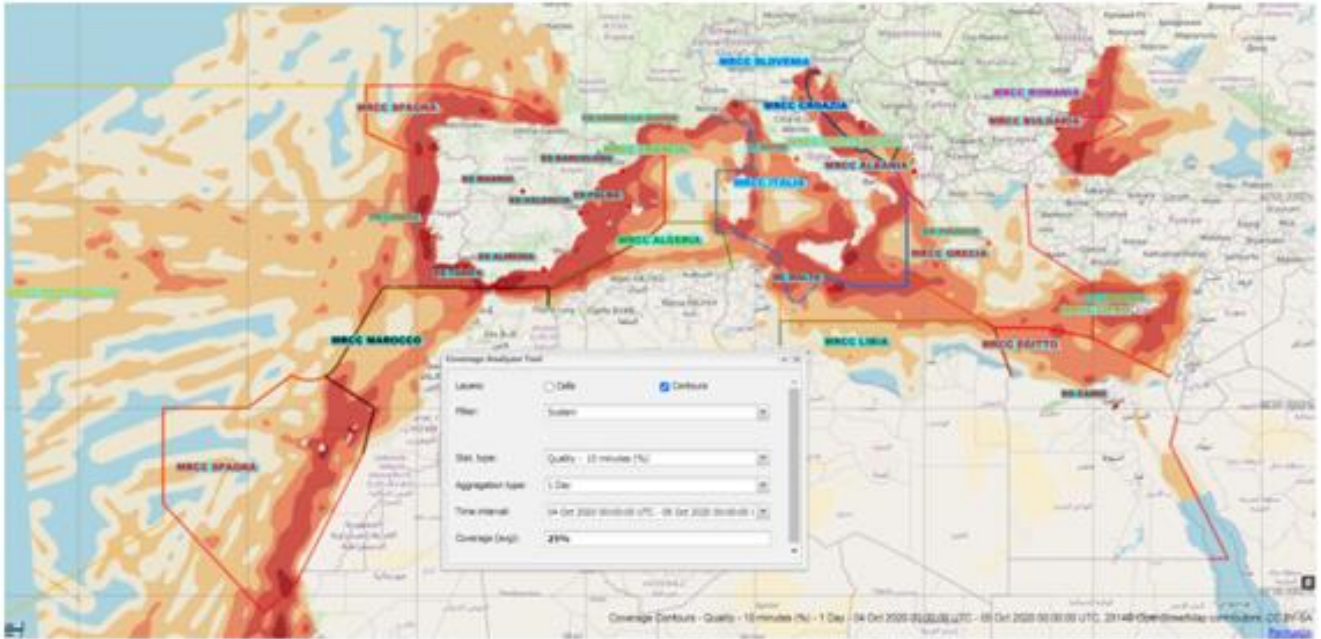


Figure 6: AIS coverage calculated for the MAREΣ region

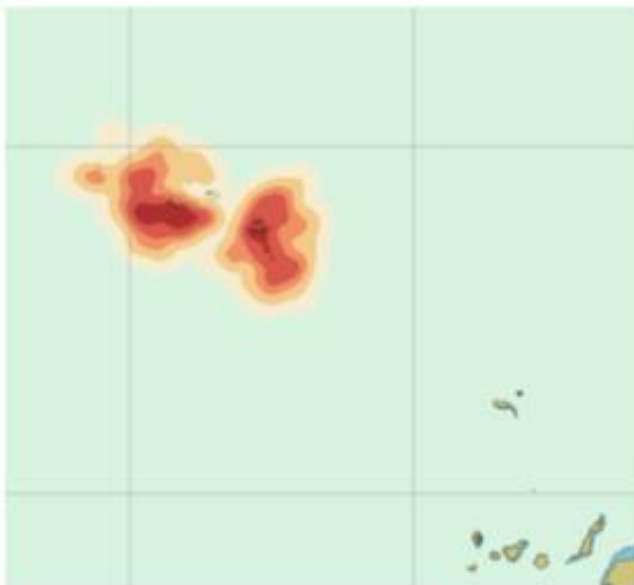


Figure 7: Azores Islands

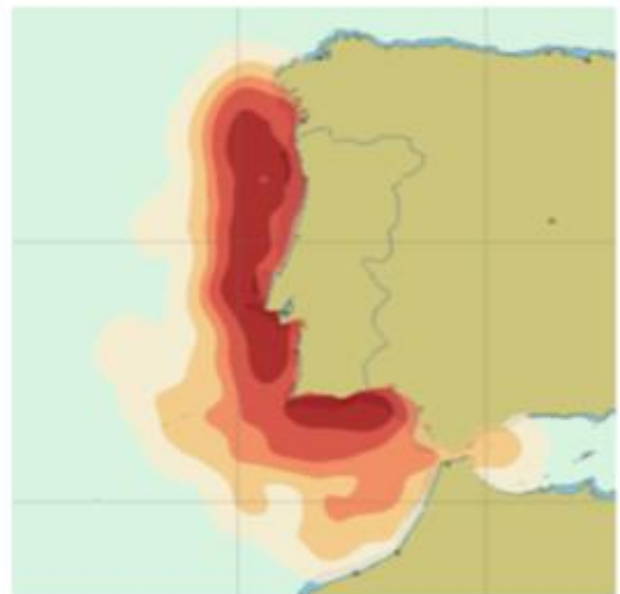


Figure 8: Portugal (mainland)

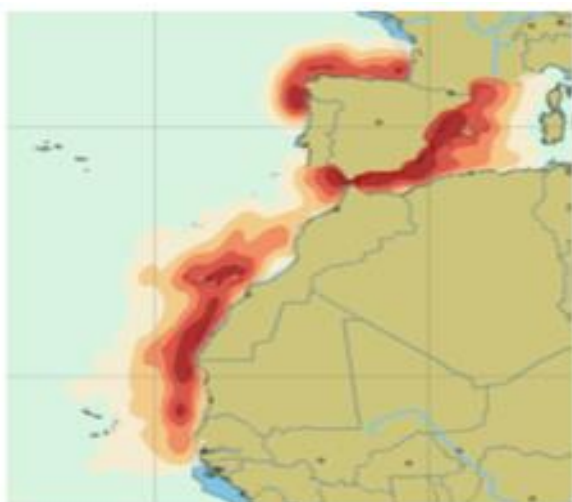


Figure 9: Spain

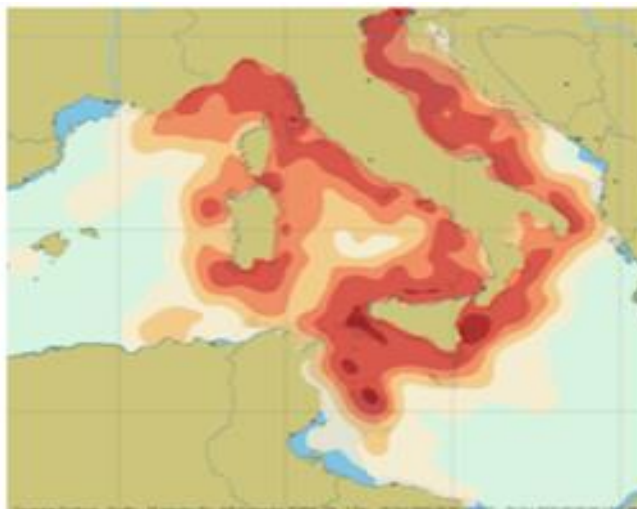


Figure 10: Italy

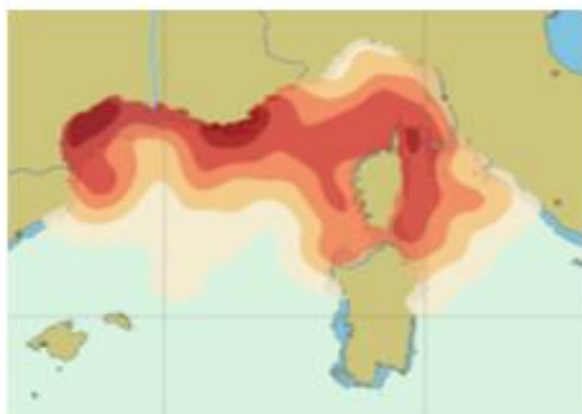


Figure 13: France

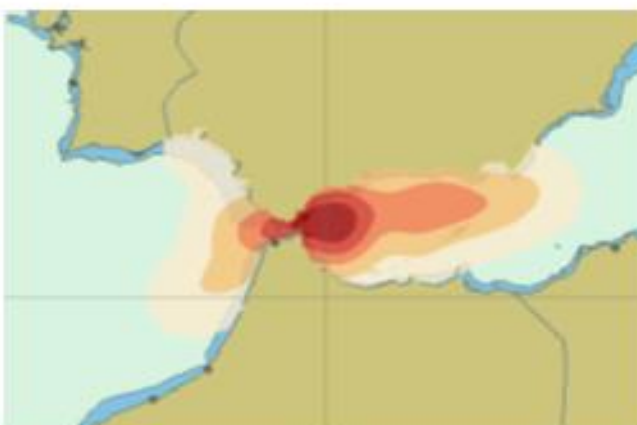


Figure 14: Gibraltar

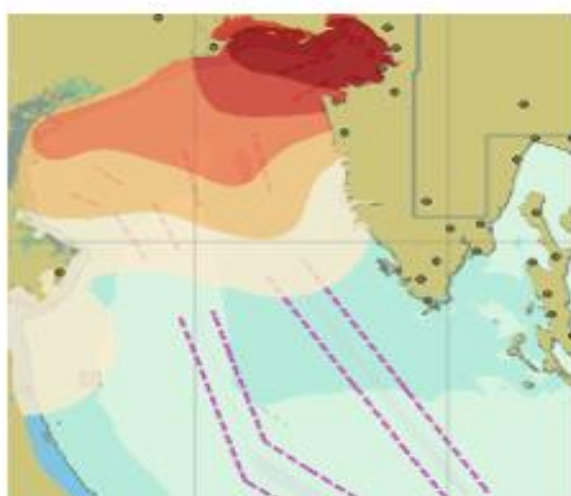


Figure 15: Slovenia

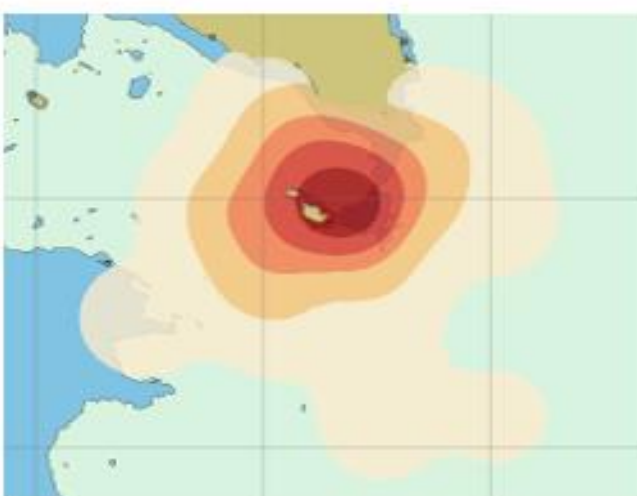


Figure 16: Malta

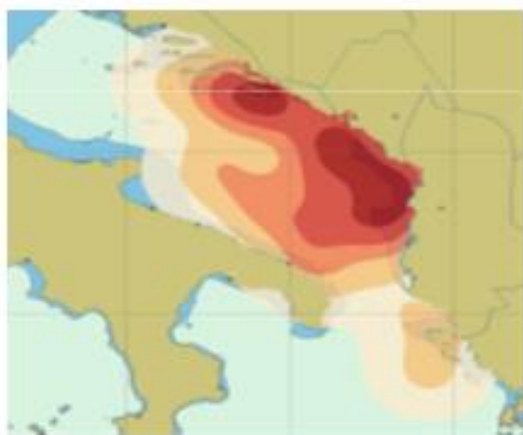


Figure 17: Montenegro

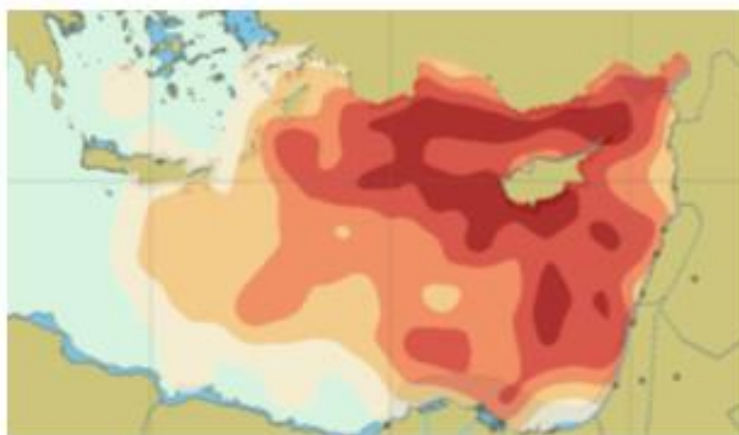


Figure 18: Cyprus



Figure 19: Greece

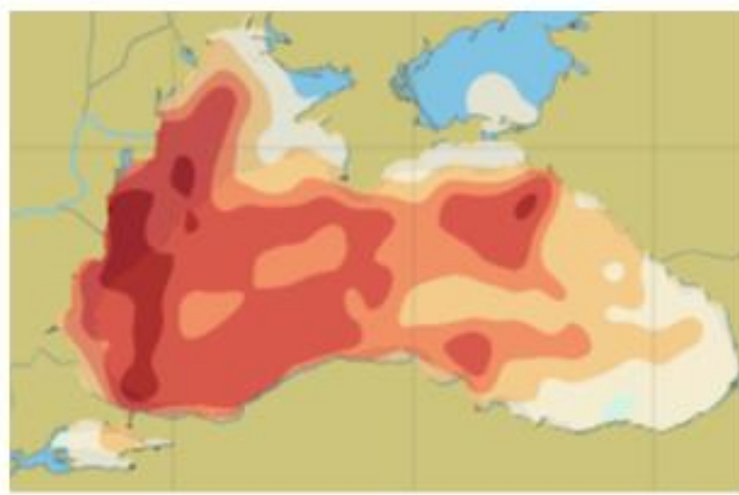


Figure 20: Romania

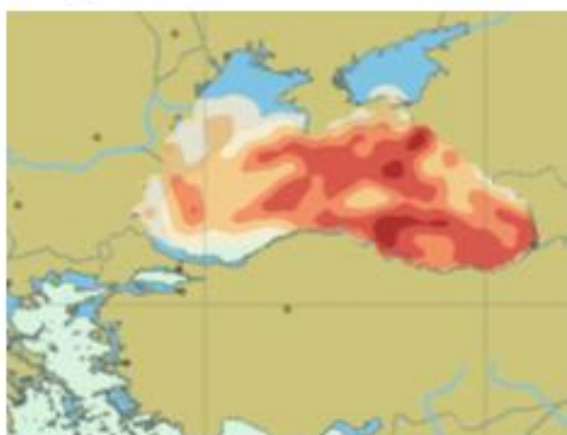


Figure 21: Georgia

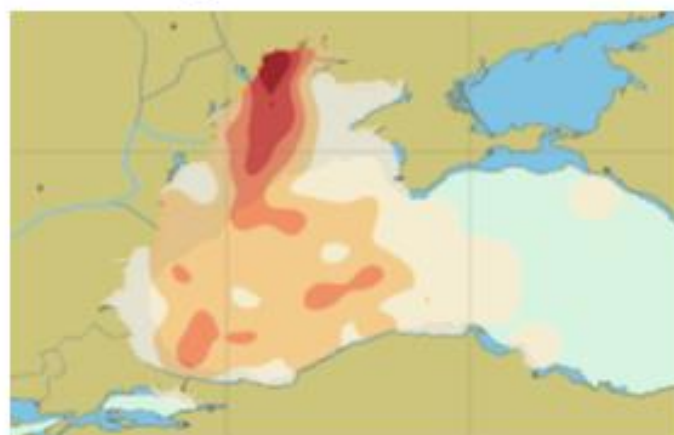


Figure 22: Ukraine

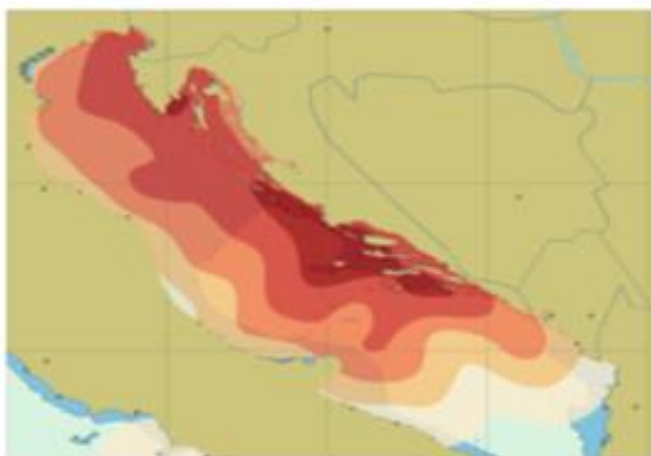


Figure 23: Croatia

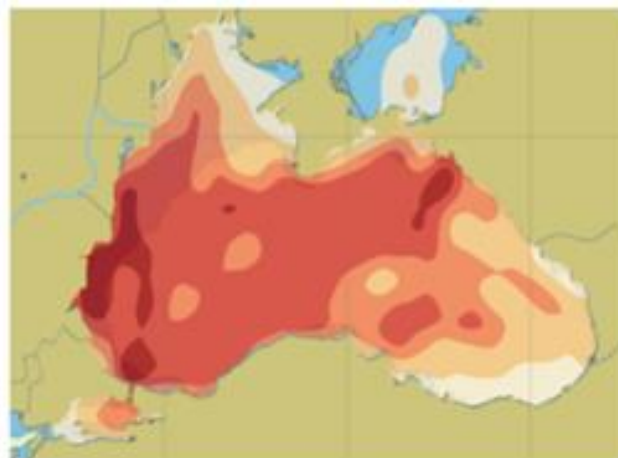


Figure 24: Bulgaria