

## Meeting: 18<sup>th</sup> Mediterranean AIS Expert Working Group

**Place and date: Videoconference, 10 December 2021**

**Agenda Item: MAREΣ network activity and monitoring report**

**Document number: MAREΣ 18/6/1**

**Submitted by Italy**

Summary	The document provides updates on the MAREΣ network and monitoring activities carried out in the period October 2020 – October 2021.
Action to be taken	As per paragraph 5.
Related documents	a. 17 <sup>th</sup> Mediterranean AIS Expert Working Group Workshop report b. MAREΣ 17/5/1 networking activity report

### 1. Introduction

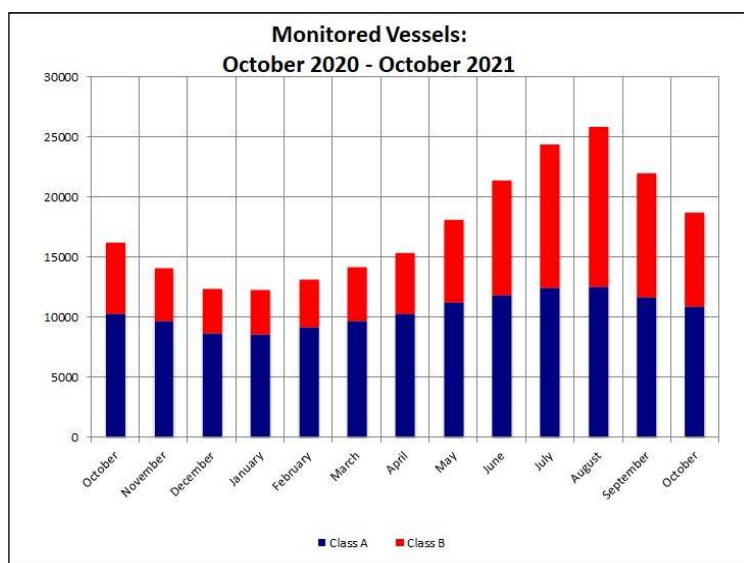
This report summarises the MAREΣ activities and describes the services provided by the Regional AIS Server between October 2020 to October 2021. During the reporting period, MAREΣ has been providing the central SafeSeaNet with AIS data gathered from the following networks: Bulgaria, Croatia, Cyprus, France, UK/Gibraltar, Greece, Italy, Malta, Portugal (including Azores and Madeira), Romania, Slovenia and Spain.

Furthermore, MAREΣ has been providing AIS information delivered by the following third Countries participating in the specific regional projects:

- Montenegro, in the context of a sharing environment implemented in the Adriatic Sea among Italy, Slovenia, Croatia and Montenegro.
- Morocco and Jordan, in the framework of the SAFEMED IV project. Tunisia has also been added since May 2019 when the Tunisian Ministry of Transport, Shipping and Maritime ports (*Office de la Marine Marchande et des Ports*) has implemented a small network based on two base stations located in Biserta and La Goulette.
- Ukraine and Georgia, in the framework of the “Black and Caspian Sea” project (BCSEA).

### 2. Level of the activity

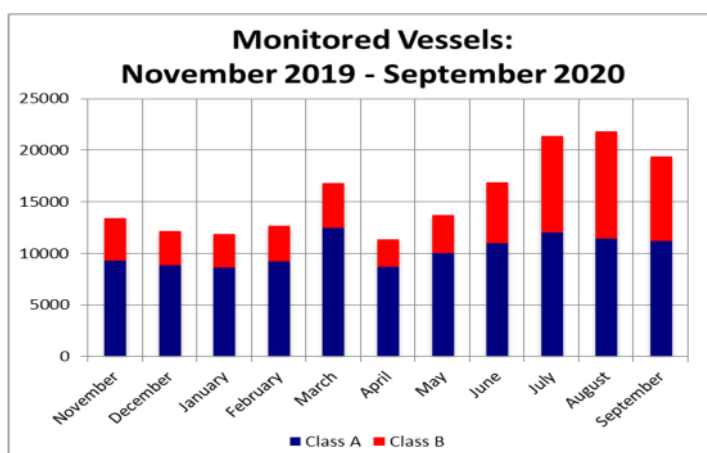
The highest number of vessels was detected during the summer period (increased traffic is attributed to the duct effect boosting the AIS radio coverage), as well as the high number of pleasure crafts. The average number of vessels monitored daily during the reference period (Oct 2020 - Oct 2021) is shown in Figure 1. The monthly amount of data for ships carrying AIS Class A are indicated in blue, and the Class B ships in red.



OCTOBER 2021: 18,712  
 SEPTEMBER 2021: 22,011  
 AUGUST 2021: 25,828  
 JULY 2021: 24,384  
 JUNE 2021: 21,397  
 MAY 2021: 18,099  
 APRIL 2021: 15,392  
 MARCH 2021: 14,167  
 FEBRUARY 2021: 13,147  
 JANUARY 2021: 12,253  
 DECEMBER 2020: 12,402  
 NOVEMBER 2020: 14,097  
 OCTOBER 2020: 16,250

Figure 1 - Number of vessels monitored from **October 2020 to October 2021**

The amount of monitored vessels in the reference period is not fully coherent with the numbers of the previous reference period (attributed to the changes in maritime traffic caused by COVID-19), leading to an average decrease of approximately 15% (between April and August 2020) (see Figure 2).



NOVEMBER 2019: 13,409  
 DECEMBER 2019: 12,136  
 JANUARY 2020: 11,835  
 FEBRUARY 2020: 12,691  
 MARCH 2020: 16,804  
 APRIL 2020: 11,338  
 MAY 2020: 13,715  
 JUNE 2020: 16,872  
 JULY 2020: 21,371  
 AUGUST 2020: 21,852  
 SEPTEMBER 2020: 19,381

Figure 2 – Number of vessels monitored from **November 2019 to September 2020**

The current MAREΣ release, running since October 2014 provides the total amount of the information collected and delivered by each participating Country, including all static, dynamic, and voyage-related data. The data duplication filtering has been carried out by the Regional system.

Annex 1 presents the amount of the AIS information provided to MAREΣ by the participating Countries during the reference period. Annex 2 presents the amount of the AIS information delivered by MAREΣ to the participating Countries and to central SSN during the reference period.

Each diagram also includes information on the downsampling configuration and the information exchange area (if the latter is different from the sharing environment of the Mediterranean EU Countries).

According to the down-sampling policy (6 min.) established in the Service Level Agreement between Italy and EMSA, the amount of the information provided by MAREΣ to the SSN central System (through the Remote Hub server) during the reference period is **1.770.597.038**.

Italy, Slovenia, Croatia and Montenegro are sharing information in the Adriatic Sea without downsampling (at full data rate) since November 2015. Ukraine is exchanging information with 6 minutes downsampling since May 2019, while Georgia is exchanging information without downsampling since January 2019. Since May 2019, Tunisia is exchanging information with 1-minute downsampling.

The amount of the AIS information delivered to MAREΣ by each of the participating Countries (MSs and third Countries), calculated from October 2020 to October 2021 is shown in the Table1.

Overall AIS information delivered by the participating Countries (October 2020 ÷ October 2021)						
BGR	CYP	ESP	FRA	GRC	HRV	ITA
959.084.707	61.098.797	1.594.469.491	209.735.672	247.099.598	1.531.102.236	4.800.406.924
MLT	MNE	PRT ISL	PRT	ROU	SVN	GIB
41.287.021	604.466.777	16.138.119	344.808.288	1.120.078.102	638.921.224	525.198.945
MOR	JDN	UKR	GEO	TUN		
32.525.423	0	557.685.448	114.161.316	104.538.591		

Table 1 - Overall AIS information delivered to MAREΣ in the reference period by participating Countries

The overall AIS information per month handled by MAREΣ in the same period is shown in Table 2.

Overall AIS information per month handled by ΜΑΡΕΣ (October 2020 ÷ October 2021)						
Oct. 2020	Nov. 2020	Dec 2020	Gen. 2021	Feb. 2021	Mar. 2021	Apr. 2021
3.983.348.745	3.894.828.960	3.580.523.319	3.509.877.786	3.555.002.121	4.400.937.974	4.386.349.495
May 2021	June 2021	Jul. 2021	Aug. 2021	Sept. 2021	Oct. 2021	
5.293.889.322	5.745.597.156	6.651.289.299	6.801.764.539	5.934.877.392	5.309.695.586	
Total: 63.047.981.694						

Table 2 - MAREΣ monthly workload in the reference period

The average number of AIS messages per second shared by MAREΣ is presented in Table 3.

Messages per second handled by MAREΣ (October 2020 ÷ October 2021)						
Oct. 2020	Nov. 2020	Dec 2020	Gen. 2021	Feb. 2021	Mar. 2021	Apr. 2021
~1.487 msg/s	~1.503 msg/s	~1.337 msg/s	~1.310 msg/s	~1.469 msg/s	~1.643 msg/s	~1.692 msg/s
May 2021	June 2021	Jul. 2021	Aug. 2021	Sept. 2021	Oct. 2021	
~1.977 msg/s	~2.217 msg/s	~2.483 msg/s	~2.539 msg/s	~2.290 msg/s	~1.982 msg/s	

Table 3 - MAREΣ monthly workload calculated in messages per second handles by the server

Tables 2 and 3 represent the overall MAREΣ workload.

### 3. MAREΣ network status

#### 3.1 Network malfunctions/incidents

During the entire observation period **148** network malfunctions (incidents), involving National Proxies and requiring a human intervention to restore operations were reported. The reported incidents, as shown in Table 4, were mainly due to breakdowns in communications between the MAREΣ Core application and the National Proxies and breakdowns in communication between the National Proxy and the related AIS network.

Month – Year	No. of reports	Involved networks
October 2020	1	Malta
November 2020	5	Romania (2), Portugal (1), Bulgaria (1), Cyprus (1)
December 2020	9	Slovenia (6), Malta (1), Italy (1), Cyprus (1)
January 2021	4	French (2), Spain (1), Slovenia (1)
February 2021	10	Greece (5), Slovenia (4), Bulgaria (1)
March 2021	4	Italy (2), Spain (2)
April 2021	11	Malta (5), Romania (2), Spain (1), Tunisia (1), France (1), Bulgaria (1)
May 2021	15	Tunisia (5), Spain (5), Malta (2), Greece (1), Bulgaria (1), Montenegro (1)
June 2021	26	Tunisia (13), Croatia (4), Ukraine (3), Greece (2), Malta (1), Bulgaria (1), Georgia (1), Cyprus (1)
July 2021	18	Tunisia (11), Greece (4), Malta (1), Georgia (1), Portugal Islands (1)
August 2021	11	Tunisia (5), Greece (3), Malta (1), Croatia (1), Montenegro 81)
September 2021	18	Tunisia (9), Malta (2), Portugal (1), Portugal Islands (1), Greece (1), Slovenia (1), Bulgaria (1), Cyprus (1), Italy (1)
October 2021	16	Tunisia (12), Spain (3), Greece (1)
<b>Total</b>	<b>148</b>	

Table 4 - Reported MAREΣ malfunctioning (incidents) during the reference period

All incidents affected the information flow from the concerned participating Countries and the functioning of MAREΣ. The incidents were detected by the “core user monitoring” tool in the MAREΣ application (Figure 3), where the breakdown in the communication between MAREΣ and the National Proxy involved is highlighted in red, while the breakdown between the AIS national network and the related National Proxy is highlighted in yellow.

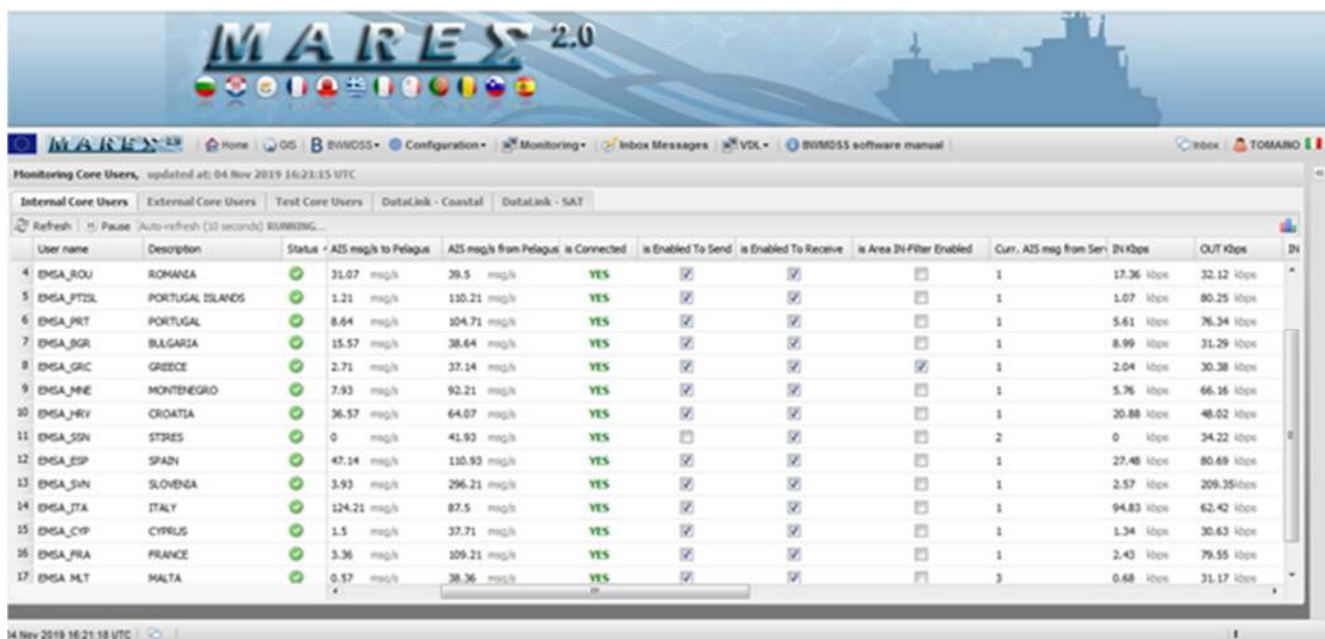


Figure 3 - MAREΣ “core user monitoring” tool

The total numbers of incidents reported to the EWG are as follow:

- **EWG 11:** 86 incidents on a 11 months period (7.8 incident/month);
- **EWG 12:** 132 incidents (this peak was due to the transition forward MAREΣ 2.0 when all the National Proxies had to change their connections);
- **EWG 13:** 100 incidents on a 12 months period (8.3 incident/month);
- **EWG 14:** 178 incidents (on a 24 months period), of which 97 incidents registered in the reference period Oct 2015 – Sept 2016 (8 incident/month) and 81 registered in the reference period Oct 2016 – Sept 2017 (6.7 incident/month);
- **EWG 15:** 60 incidents on a 12 months period (5 incident/month);
- **EWG 16:** 80 incidents on a 13 months period (6.1 incident/month);
- **EWG 17:** 70 incidents on a 11 months period (6.3 incident/month).

The average number of incidents per month observed during the last seven years was about 7,5 failures per month.

### 3.2 Failure restoring and incident processing time

The availability of the links, including the connection status of the National Proxies (NPRs) and the exchanging rate of the AIS information between NPRs and MAREΣ as well as between MAREΣ and the SSN central application was monitored.

The total elapsed time to restore all the failures registered during the reference period (i.e. the processing time of the incident) was **1.759,4 hours**, and it varied between 7,22 hours (March 2021) and 335,6 hours (December 2020) per month (see Table 5).

The average total elapsed time needed to restore the failures was about **135.3 h**.

Month	Oct. 2020	Nov. 2020	Dec. 2020	Jan. 2021	Feb. 2021	Mar. 2021	Apr. 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Oct 2021	Total
No. Incidents	1	5	9	4	10	4	11	15	26	18	11	18	16	148
Minutes	31.286	3.732	20.137	487	1.479	432	4.944	4.158	7.513	5603	9.660	12.202	3.935	105.568
Hours	521,4	62,2	335,6	8,1	24,6	7,2	82,4	69,3	125,2	93,4	161	203,4	65,6	1.759,4

Table 5 - Total elapsed time needed to restore the failures

The numbers shows that results are better than those presented at the 17<sup>th</sup> EWG (related to the period: November 2019 ÷ September 2020), when the following results were presented:

- total elapsed time to restore the failures: 431,4 hours;
- average elapsed time to restore the failures: 6,16 hours.

Table 6 presents failures and related incidents, with the National Proxies, which affected the registered incident processing time, as defined in the SLA between ICG and EMSA, and exceeded the maximum time established for restoring the AIS data transfer from the national proxies to MAREΣ.

Report Date	MAREΣ Incident number	Participant Country involved	Processing time	Root cause of incidents
September 08 <sup>th</sup> 2021	20210908-2	Portugal Island	5 <sup>d</sup> 22 <sup>h</sup> 03 <sup>m</sup>	NIL
September 09 <sup>th</sup> 2021	20210909-2	Malta	12 <sup>h</sup> 35 <sup>m</sup>	NIL

Table 6 – Number of incidents that exceeded the maximum time established for restoring the AIS data transfer

### 3.3 MAREΣ/STAR STREAMING-REMOTE HUB incidents

No incidents affected MAREΣ STAR Streaming Remote Hub in the reference period.

### 3.4 Link availability

Diagrams in Annex 3 present the link availability for each NPR of the participating Countries during the reference period. The overall availability is affected by the incidents involving the National Proxy, the breakdown in communication and, if occurred, by the MAREΣ inactivity periods.

## 4. MAREΣ upgrading

### 4.1 STAR RH upgrading

The agreed migration to the last release (1.2) of the STAR Streaming Remote Hub interface (replaced the SSN SI application) was completed during the reference period, for both, the pre-production, production, and backup environments. After this upgrade, the SSN-SI (production and backup environments) has been permanently disabled.

Currently only STAR Streaming Remote Hub environments (pre-production, production, and backup) are working to transmit and receive T-AIS and SAT-AIS data stream from and towards EMSA.

As agreed with EMSA, a test on the stored (*backlog*) data retransmission through the RH backlog solution was performed. The objective of this exercise was to test the solution implemented by ICG to retransmit backlog data, the reception by the central SSN and the insertion in the main dataset.

#### 4.2 Solution in MAREΣ for the AIS data retransmission

During the 9<sup>th</sup> SSN/LRIT Group Meeting, organised by EMSA on the 25 May 2021, the paper “AIS status update” was presented. This document described the solutions for the AIS data (buffered or stored by the national AIS systems in case of the NPR or Regional Server malfunction) retransmission provided manually by Member States to the Regional AIS Server.

The MAREΣ solution for the manual retransmission of the stored data by MSs is based on the data files transfer by MS and the data uploading by the ICG personnel. To resent the stored data manually to MAREΣ, the solution requires certain tasks to be performed by the RS administrator and the MSs NPR Administrators.

The data retransmission solution is presented in the meeting document MAREΣ 18/9/1.

#### 4.3 Integration of AIS information acquired by the ICG patrol vessel

Since March 2021 the ICG added to MAREΣ (for testing purposes), a new provider called “ITA\_DATA LINK”. This provider was powered with AIS information acquired by five (5) coast guard naval units equipped with a device called “Data Link” enabling them to transmit through an IP satellite connection the AIS information acquired by the vessels themselves. Currently the information acquired through Data Links are only visualized to the MAREΣ GIS and **are not** delivered to EMSA or other MAREΣ participant Countries in the AIS streams.

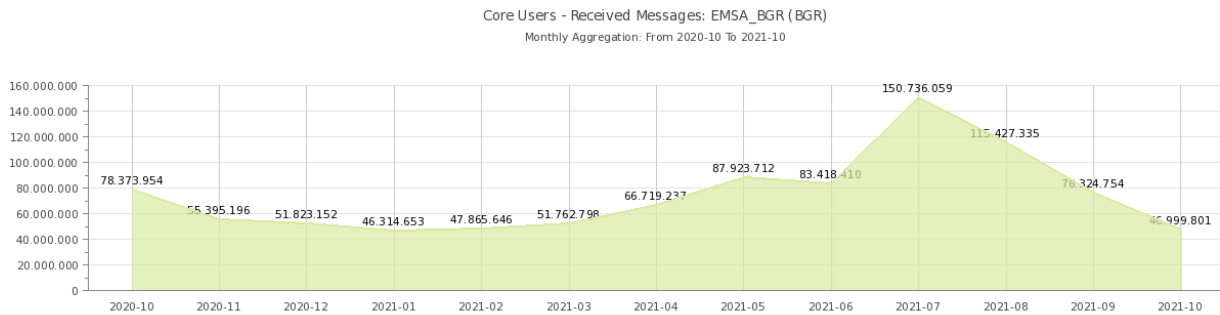
The results of testing are presented in the meeting document MAREΣ 18/10/1.

### Action required

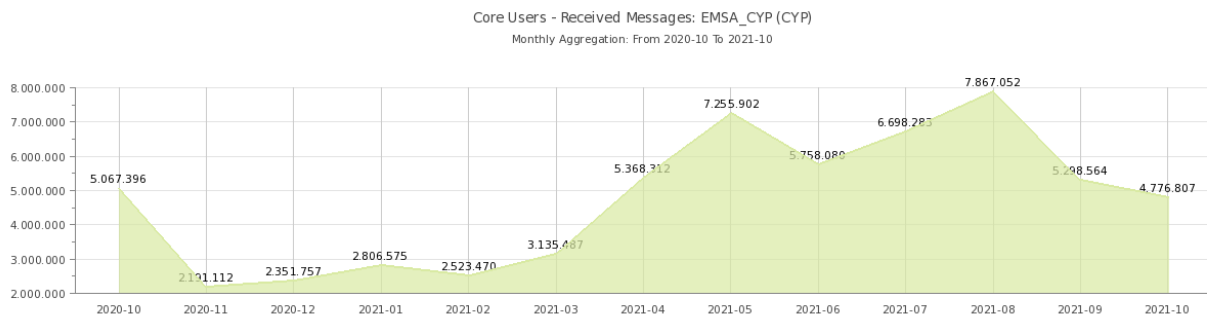
Participating Countries are invited to **note** the submitted information.

## Annex 1

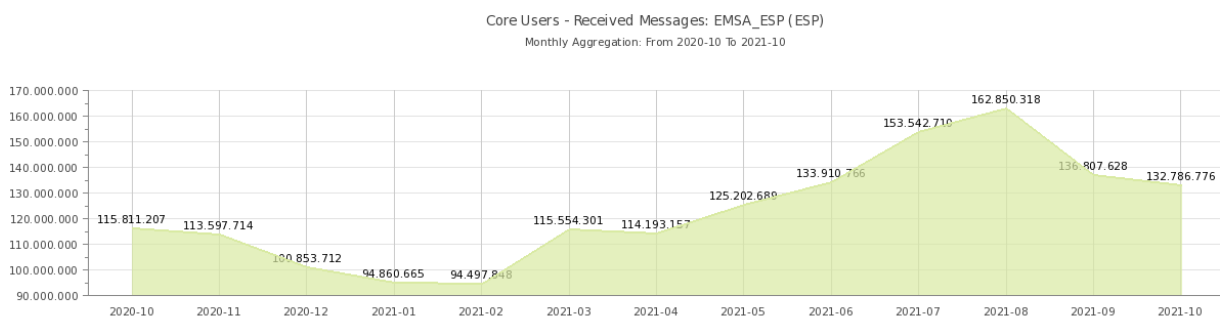
### AIS information provided to MAREΣ by the participating Countries



AIS information delivered by Bulgaria (full data rate since December 2016)



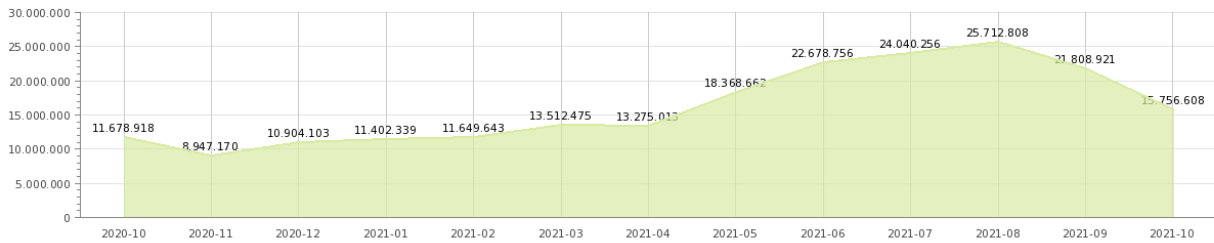
AIS information delivered by Cyprus (downsampling 6 min)



AIS information delivered by Spain (downsampling 1 min)

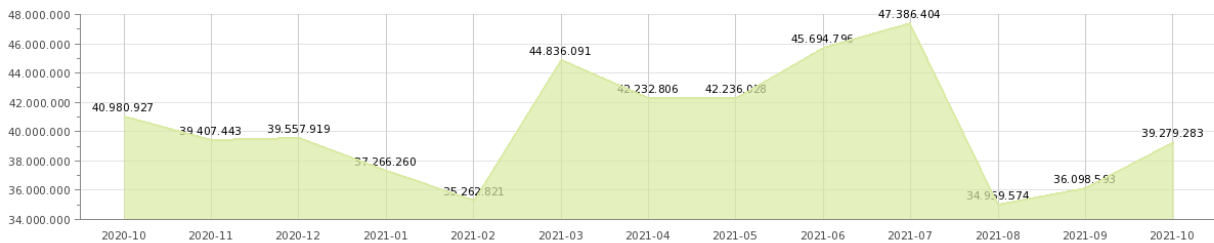


Core Users - Received Messages: EMSA\_FRA (FRA)  
Monthly Aggregation: From 2020-10 To 2021-10



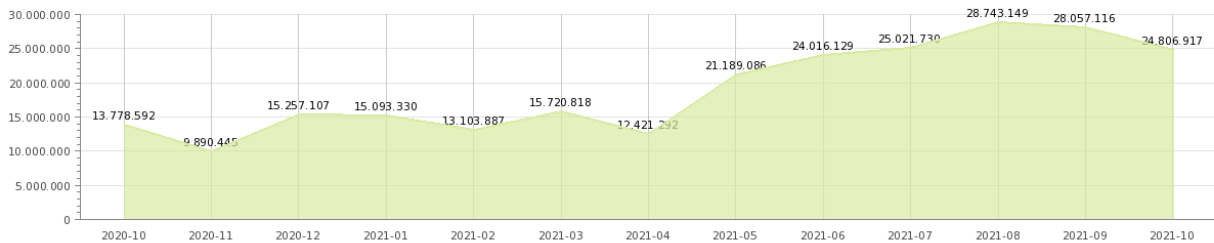
AIS information delivered by France (downsampling 1 min)

Core Users - Received Messages: EMSA\_GIB (GIB)  
Monthly Aggregation: From 2020-10 To 2021-10



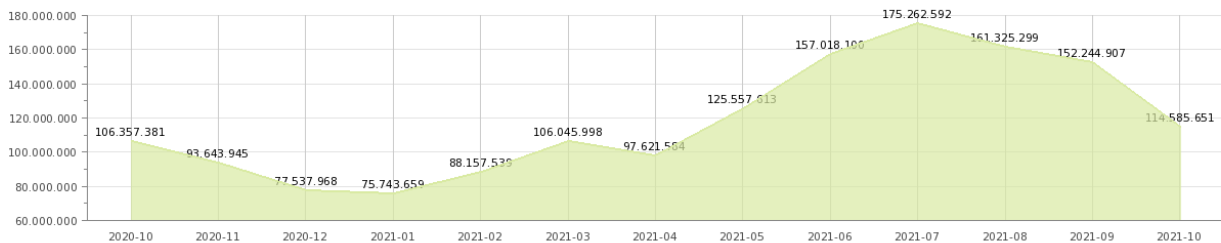
AIS information delivered by Gibraltar (full data rate)

Core Users - Received Messages: EMSA\_GRC (GRC)  
Monthly Aggregation: From 2020-10 To 2021-10



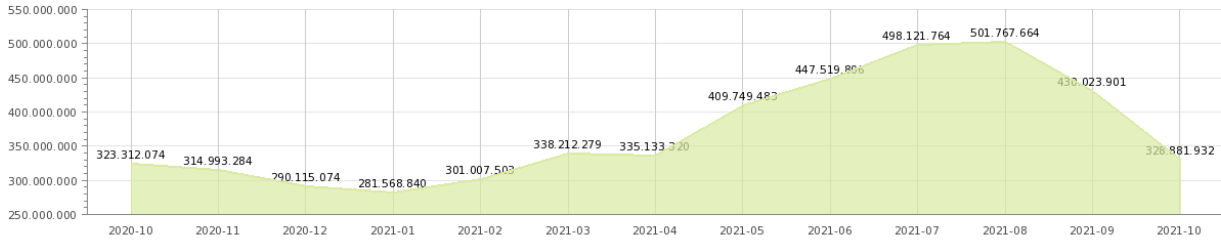
AIS information delivered by Greece (downsampling 6 min)

Core Users - Received Messages: EMSA\_HRV (HRV)  
Monthly Aggregation: From 2020-10 To 2021-10



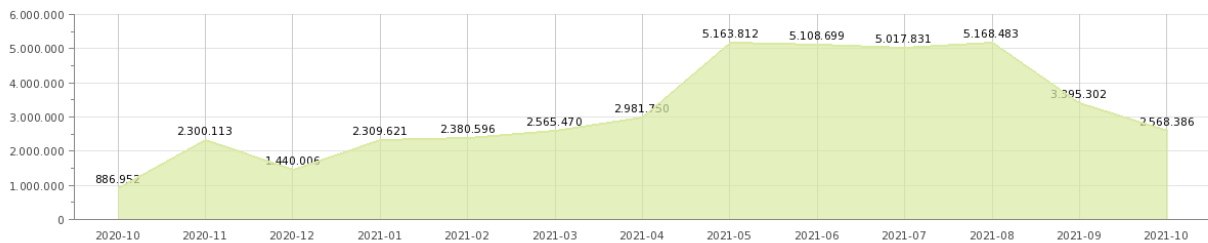
AIS information delivered by Croatia (full data rate since December 2015)

Core Users - Received Messages: EMSA\_ITA (ITA)  
Monthly Aggregation: From 2020-10 To 2021-10



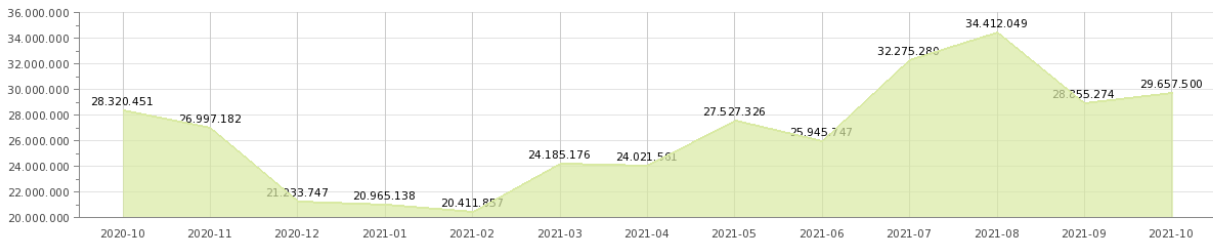
AIS information delivered by Italy (full data rate since February 2016)

Core Users - Received Messages: EMSA\_MLT (MLT)  
Monthly Aggregation: From 2020-10 To 2021-10



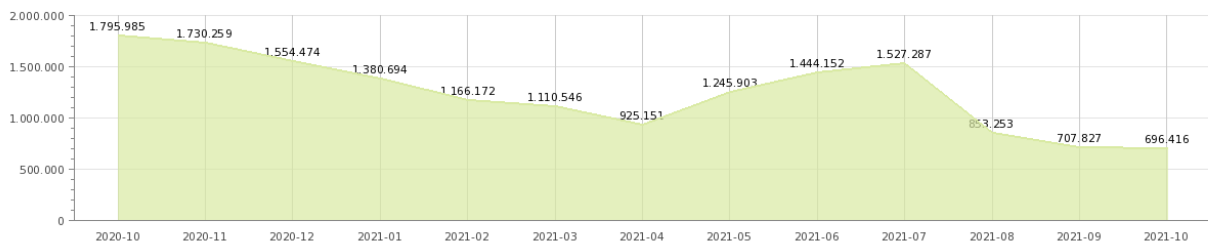
AIS information delivered by Malta (downsampling 6 min)

Core Users - Received Messages: EMSA\_PRT (PRT)  
Monthly Aggregation: From 2020-10 To 2021-10



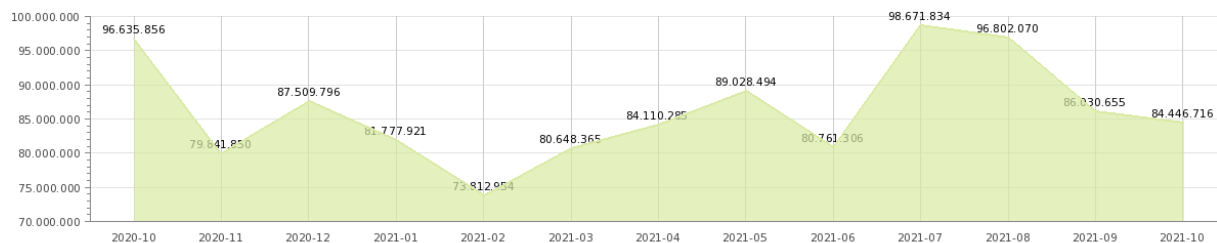
AIS information delivered by Portugal mainland (downsampling 1 min)

Core Users - Received Messages: EMSA\_PTISL (PRT)  
Monthly Aggregation: From 2020-10 To 2021-10



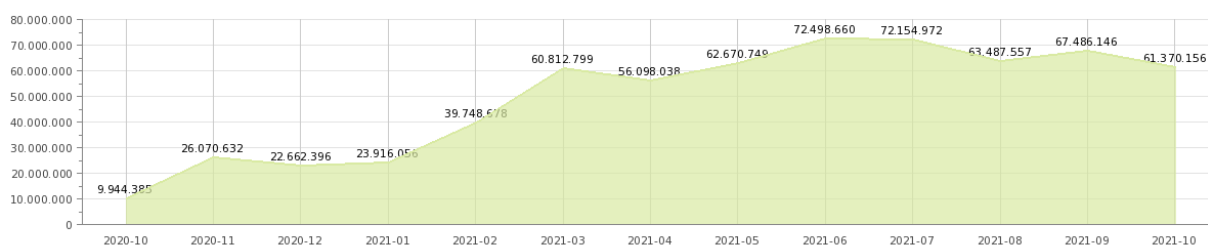
AIS information delivered by Portugal Azores and Madeira (downsampling 1 min)

Core Users - Received Messages: EMSA\_ROU (ROU)  
Monthly Aggregation: From 2020-10 To 2021-10



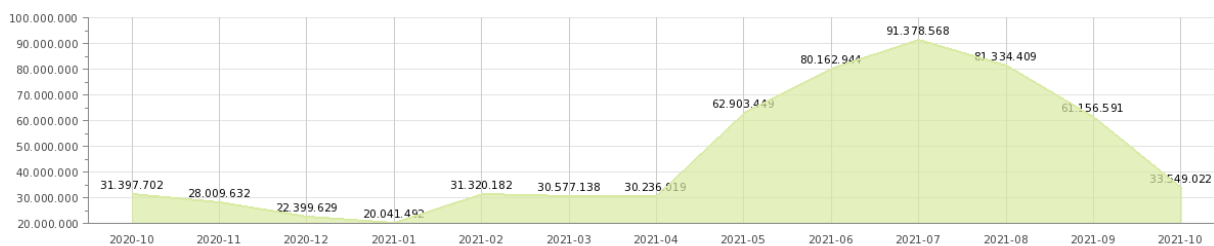
### AIS information delivered by Romania (full data rate since December 2016)

Core Users - Received Messages: EMSA\_SVN (SVN)  
Monthly Aggregation: From 2020-10 To 2021-10



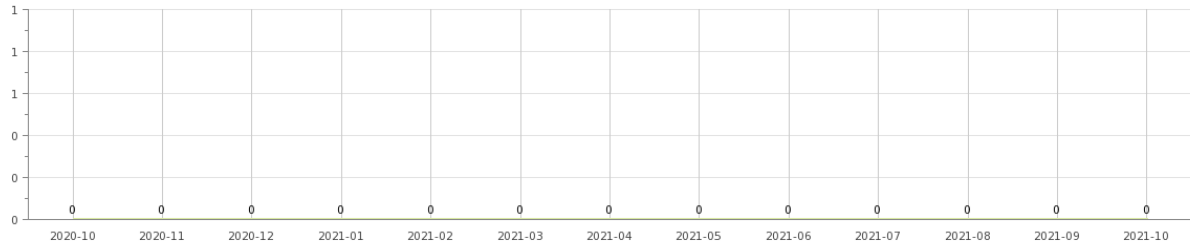
### AIS information delivered by Slovenia (full data rate since December 2015)

Core Users - Received Messages: EMSA\_MNE (MNE)  
Monthly Aggregation: From 2020-10 To 2021-10



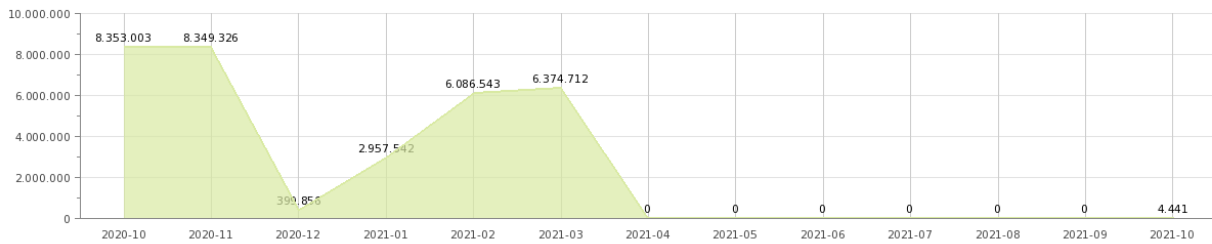
### AIS information delivered by Montenegro (full data rate since December 2015)

Core Users - Received Messages: SAFEMED\_JORDAN (JOR)  
Monthly Aggregation: From 2020-10 To 2021-10



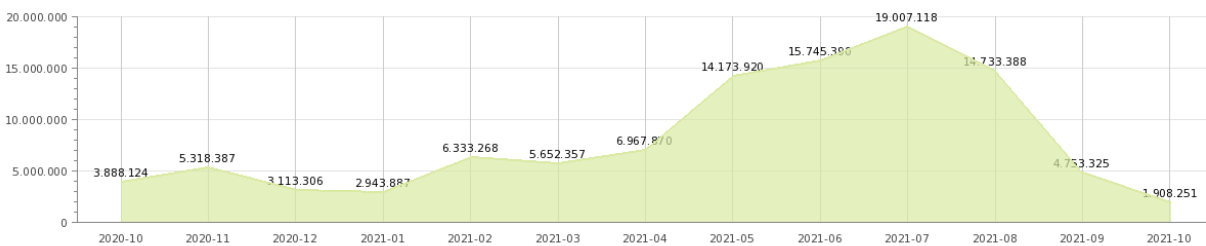
AIS information delivered by Jordan (sharing among SafeMed countries, full data rate)

Core Users - Received Messages: SAFEMED\_MOROCCO (MAR)  
Monthly Aggregation: From 2020-10 To 2021-10

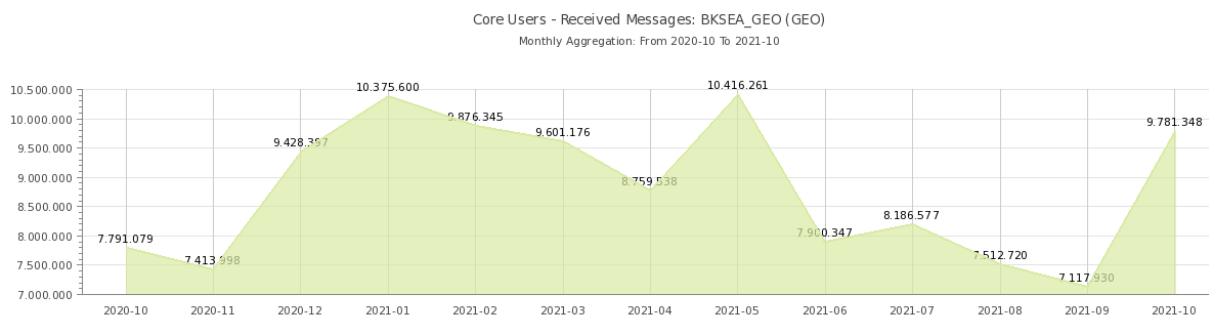


AIS information delivered by Morocco (sharing among SafeMed countries, full data rate)

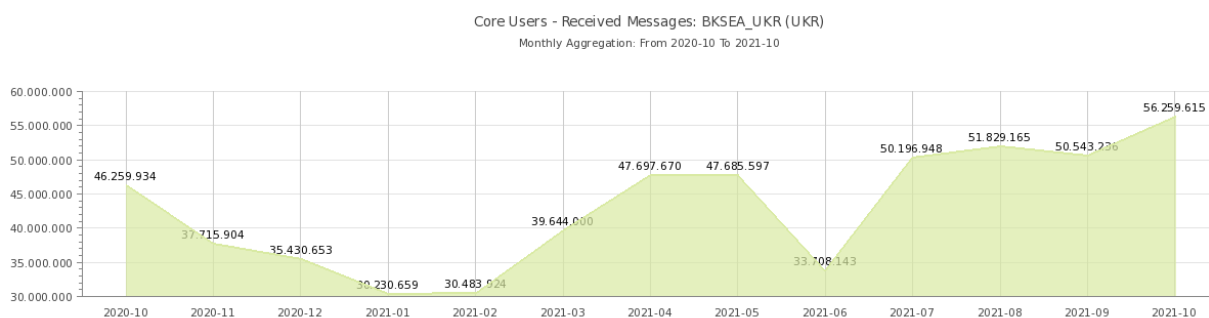
Core Users - Received Messages: SAFEMED\_TUNISIA (TUN)  
Monthly Aggregation: From 2020-10 To 2021-10



AIS information delivered by Tunisia (sharing among SafeMed countries, full data rate)



AIS information delivered by Georgia (sharing among BCSEA countries, full data rate)

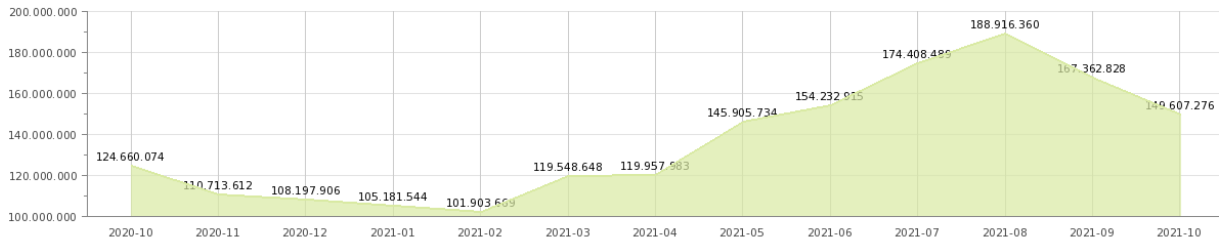


AIS information delivered by Ukraine (sharing among BCSEA countries, full data rate)

## Annex 2

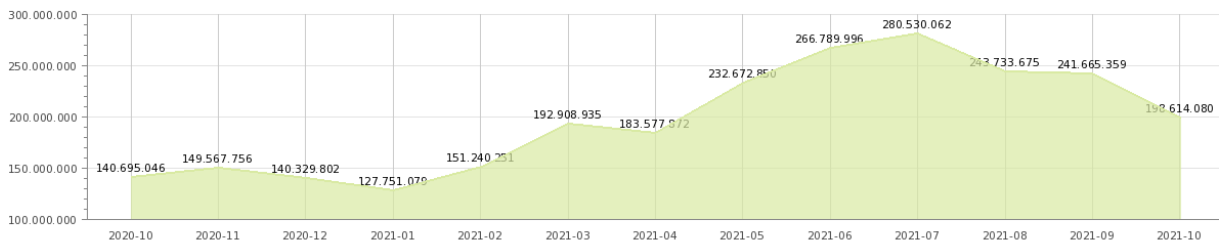
### AIS information delivered by MAREΣ

Core Users - Transmitted Messages: EMSA\_REMOTEHUBPROD (EMS)  
Monthly Aggregation: From 2020-10 To 2021-10



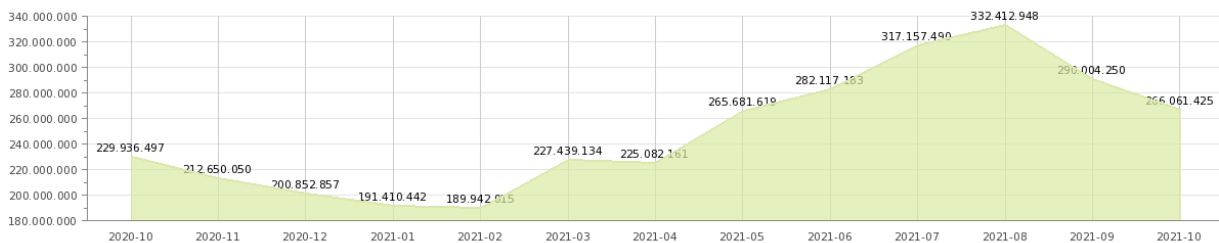
### AIS information delivered to SafeSeaNet (downsampling 6 min)

Core Users - Transmitted Messages: EMSA\_HRV (HRV)  
Monthly Aggregation: From 2020-10 To 2021-10



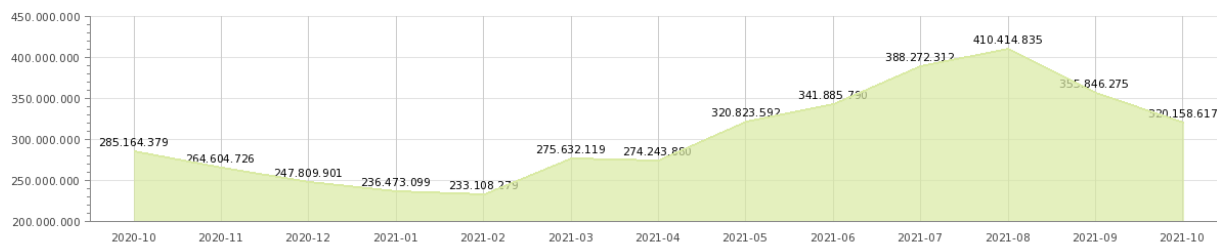
### AIS information delivered to Croatia (Adriatic Region - full data rate since December 2015)

Core Users - Transmitted Messages: EMSA\_ITA (ITA)  
Monthly Aggregation: From 2020-10 To 2021-10



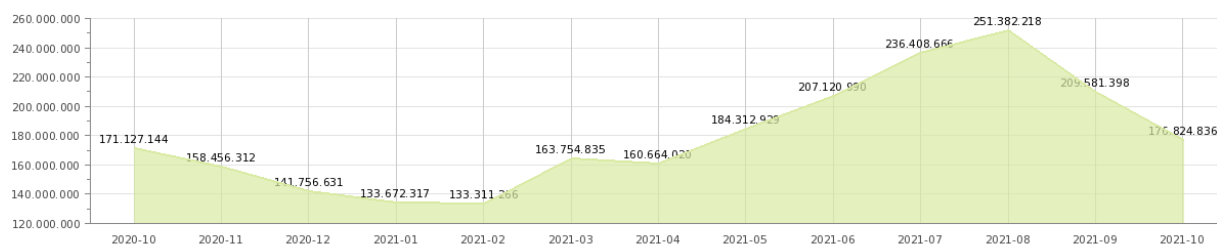
### AIS information delivered to Italy (downsampling 1 min)

Core Users - Transmitted Messages: EMSA\_FRA (FRA)  
Monthly Aggregation: From 2020-10 To 2021-10



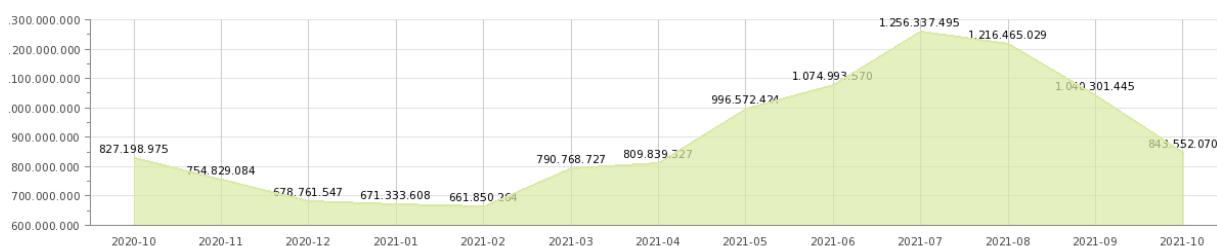
### AIS information delivered to France (downsampling 1 min)

Core Users - Transmitted Messages: MARYLIN (FRA)  
Monthly Aggregation: From 2020-10 To 2021-10



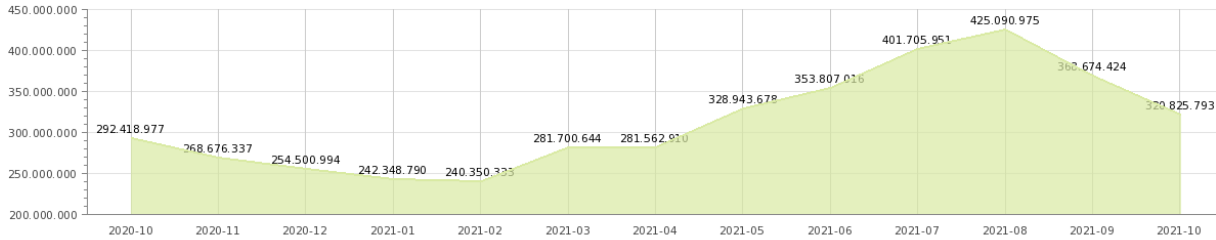
### AIS information delivered to France (for needs of the Marylin project – full data rate)

Core Users - Transmitted Messages: EMSA\_SVN (SVN)  
Monthly Aggregation: From 2020-10 To 2021-10



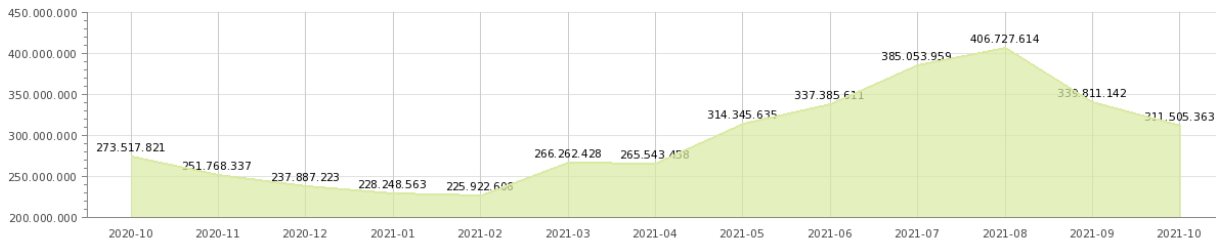
### AIS information delivered to Slovenia (Adriatic Region - full data rate)

Core Users - Transmitted Messages: EMSA\_ESP (ESP)  
Monthly Aggregation: From 2020-10 To 2021-10



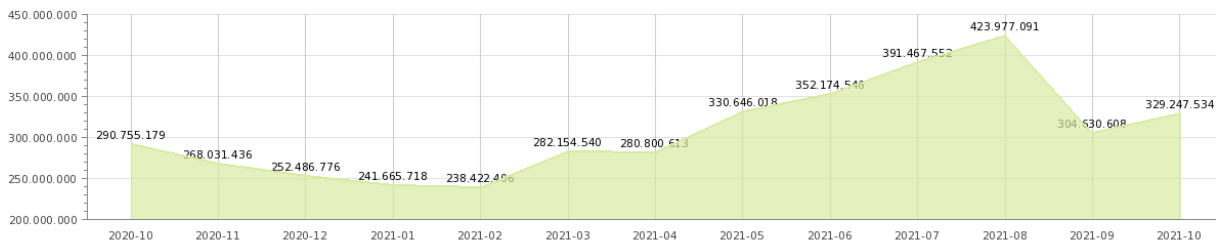
### AIS information delivered to Spain (downsampling 1 min)

Core Users - Transmitted Messages: EMSA\_PRT (PRT)  
Monthly Aggregation: From 2020-10 To 2021-10



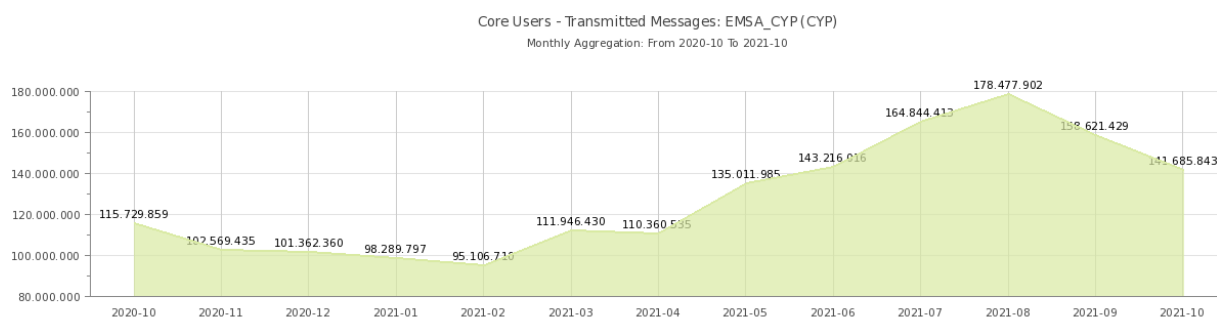
### AIS information delivered to Portugal mainland (downsampling 1 min)

Core Users - Transmitted Messages: EMSA\_PTISL (PRT)  
Monthly Aggregation: From 2020-10 To 2021-10

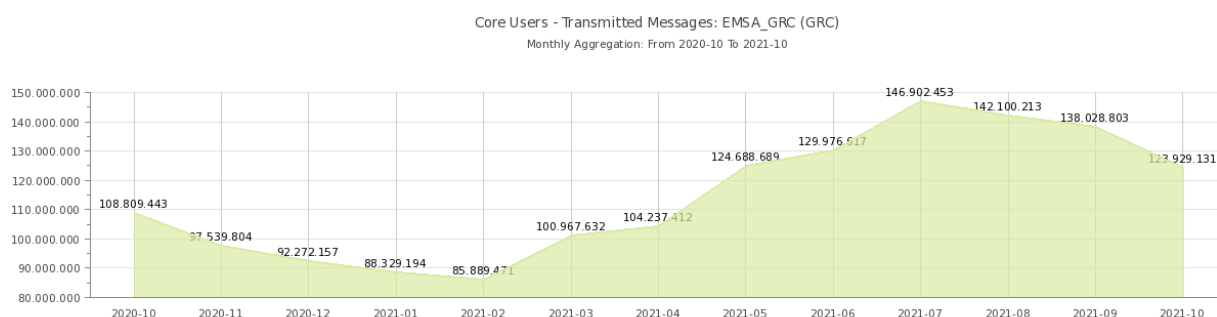


### AIS information delivered to Portugal Island (downsampling 1 min)

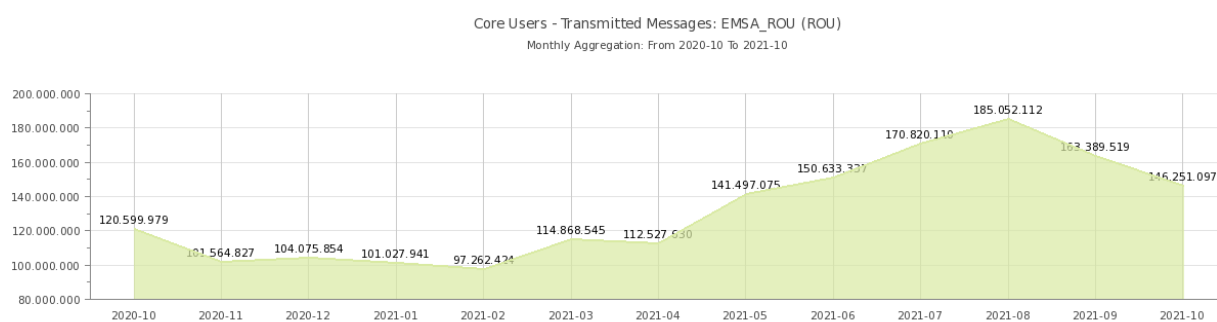




AIS information delivered to Cyprus (downsampling 6 min)

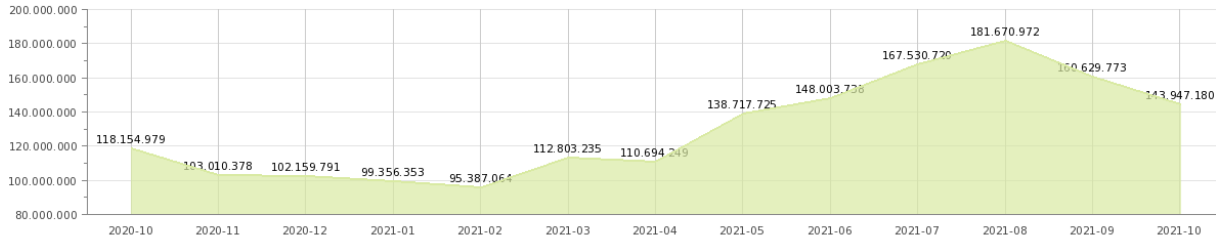


AIS information delivered to Greece (downsampling 6 min)



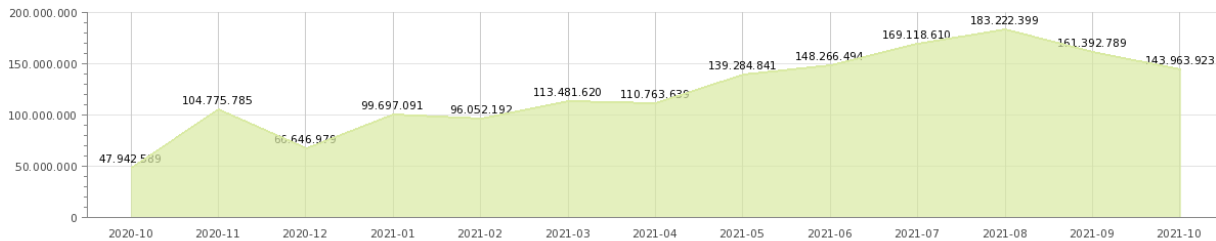
AIS information delivered to Romania (downsampling 6 min)

Core Users - Transmitted Messages: EMSA\_BGR (BGR)  
Monthly Aggregation: From 2020-10 To 2021-10



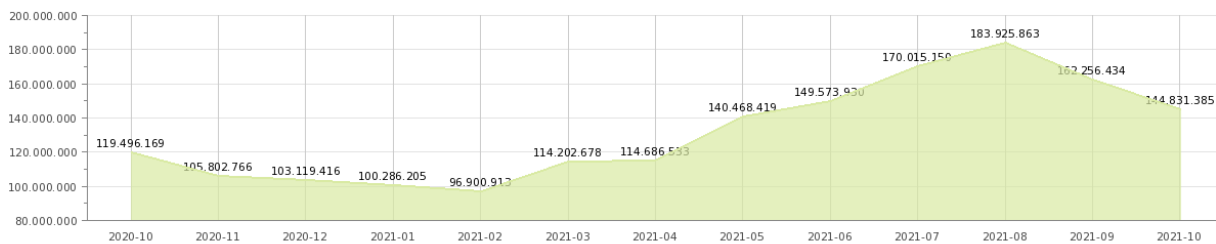
AIS information delivered to Bulgaria (downsampling 6 min)

Core Users - Transmitted Messages: EMSA\_MLT (MLT)  
Monthly Aggregation: From 2020-10 To 2021-10



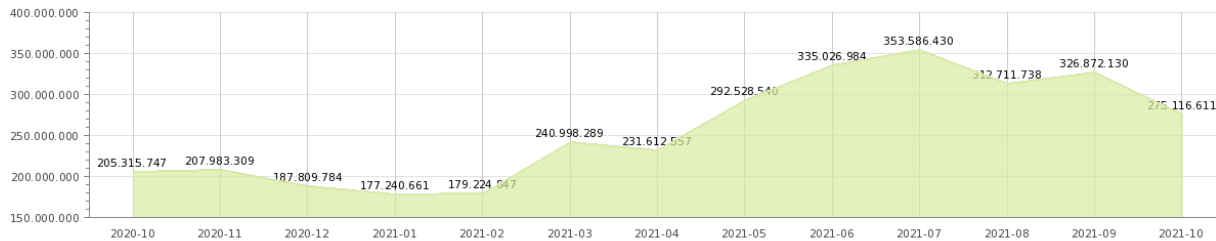
AIS information delivered to Malta (downsampling 6 min)

Core Users - Transmitted Messages: EMSA\_GIB (GIB)  
Monthly Aggregation: From 2020-10 To 2021-10



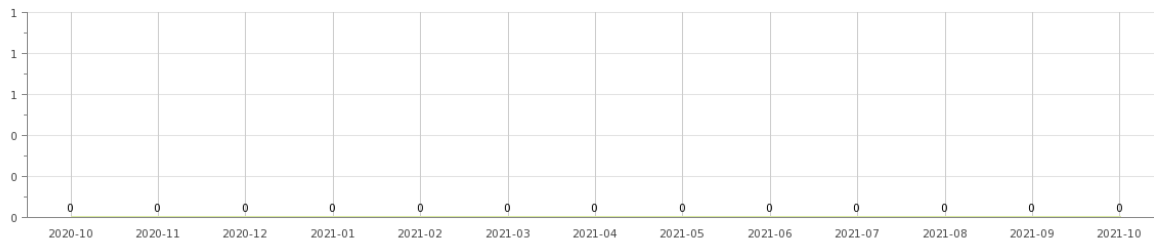
AIS information delivered to Gibraltar (downsampling 6 min)

Core Users - Transmitted Messages: EMSA\_MNE (MNE)  
Monthly Aggregation: From 2020-10 To 2021-10



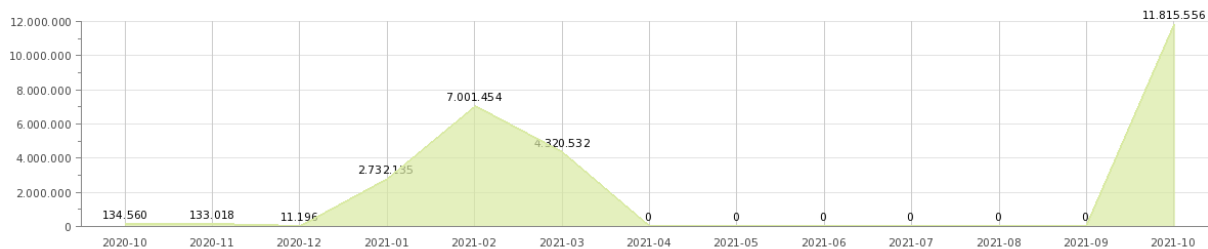
AIS information delivered to Montenegro (Adriatic Region – full data rate since December 2015)

Core Users - Transmitted Messages: SAFEMED\_JORDAN (JOR)  
Monthly Aggregation: From 2020-10 To 2021-10



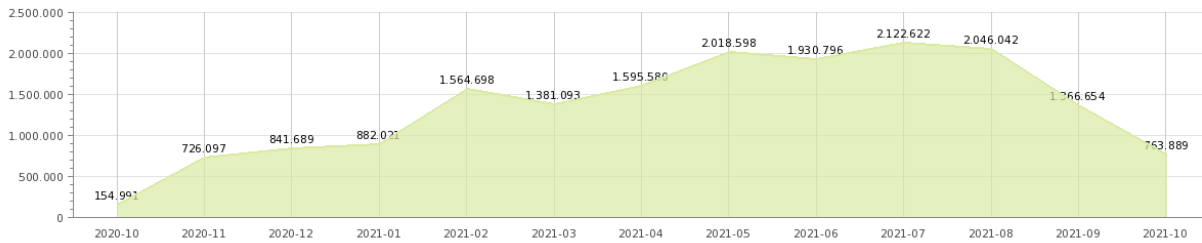
AIS information delivered to Jordan (SAFEMED – full data rate)

Core Users - Transmitted Messages: SAFEMED\_MOROCCO (MAR)  
Monthly Aggregation: From 2020-10 To 2021-10



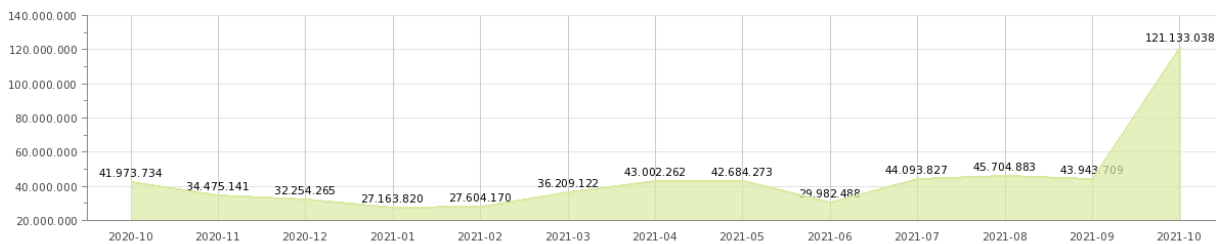
AIS information delivered to Morocco (SAFEMED – full data rate)

Core Users - Transmitted Messages: SAFEMED\_TUNISIA (TUN)  
Monthly Aggregation: From 2020-10 To 2021-10



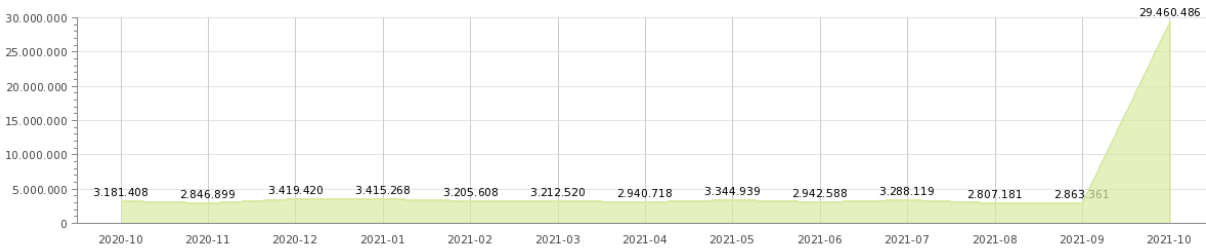
### AIS information delivered to Tunisia (SAFEMED – 1 minute downsampling)

Core Users - Transmitted Messages: BKSEA\_GEO (GEO)  
Monthly Aggregation: From 2020-10 To 2021-10



### AIS information delivered to Georgia (BCSEA – Full Data rate)

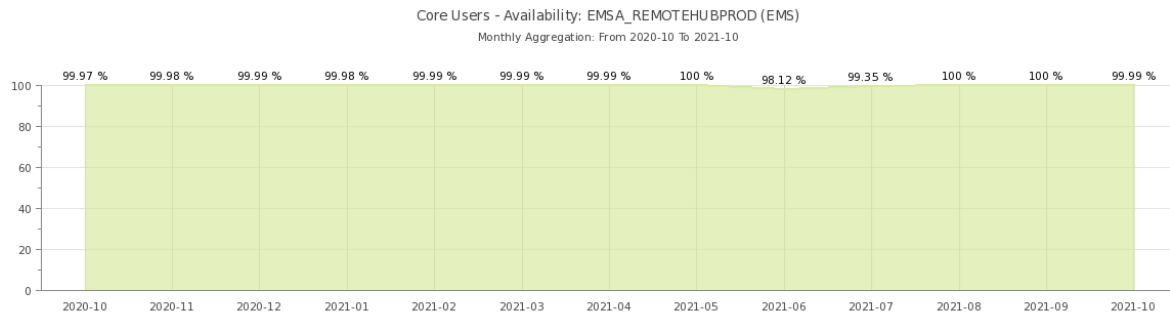
Core Users - Transmitted Messages: BKSEA\_UKR (UKR)  
Monthly Aggregation: From 2020-10 To 2021-10



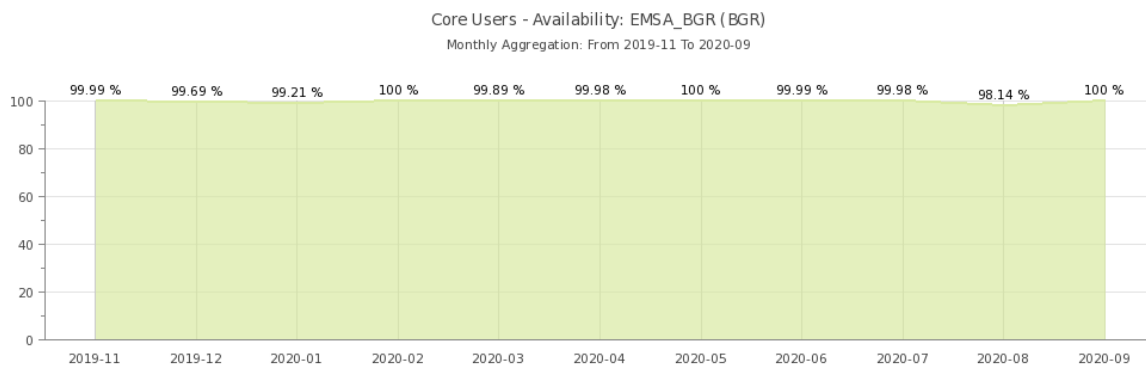
### AIS information delivered to Ukraine (BCSEA – Full Data Rate)

## Annex 3

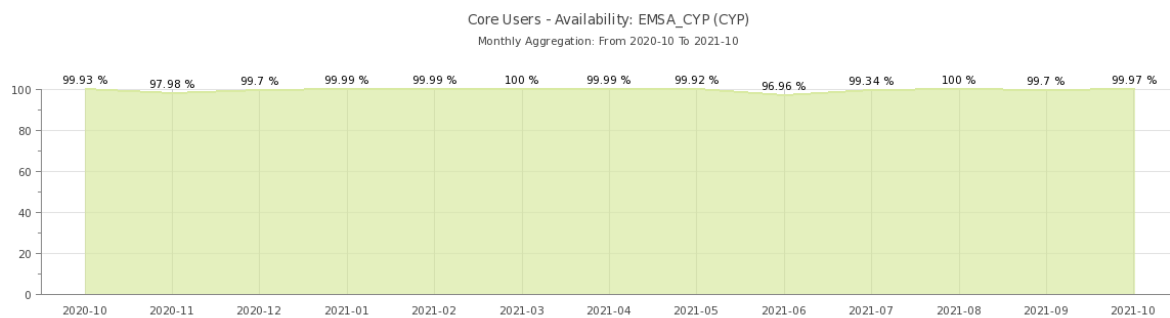
### Link availability



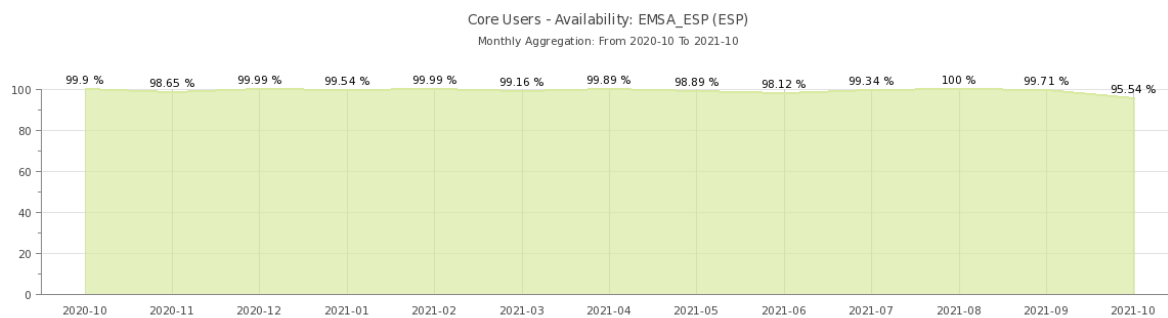
#### SSN (Remote Hub host)



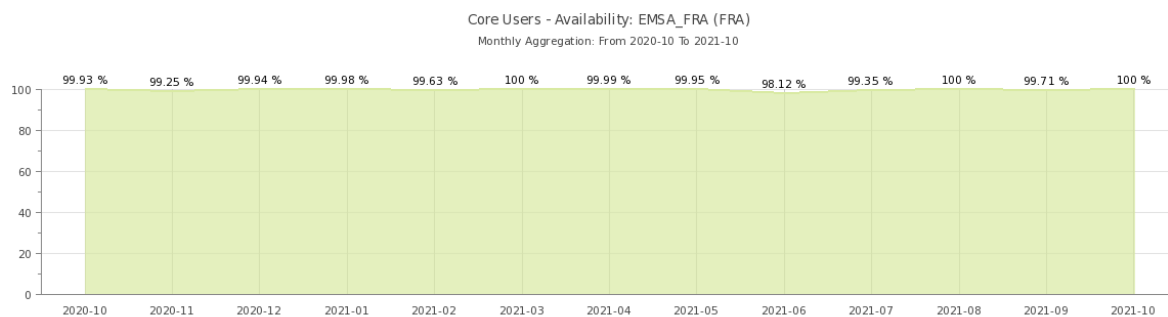
#### Bulgaria



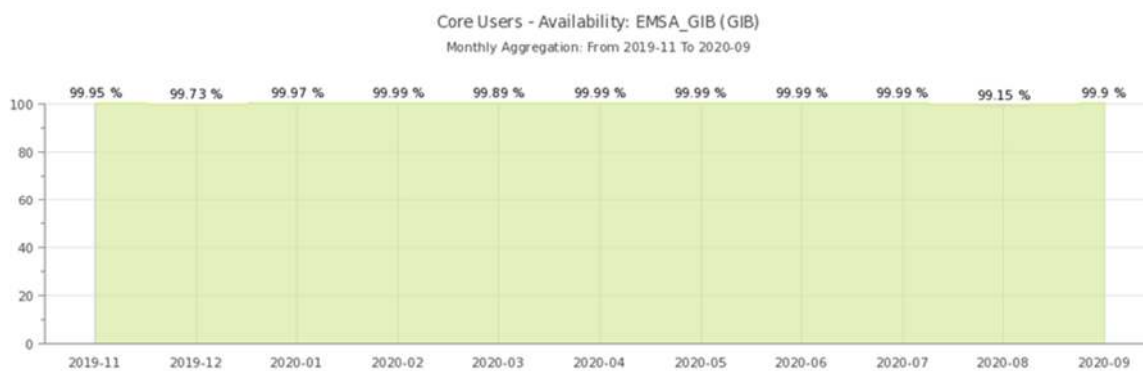
#### Cyprus



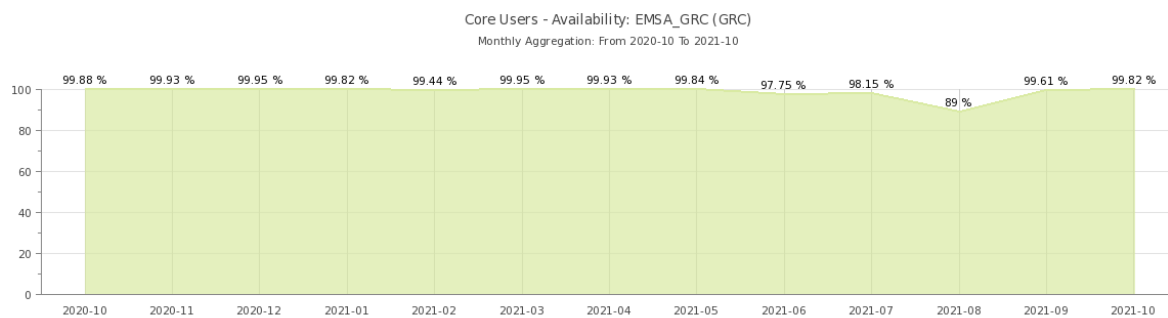
## Spain



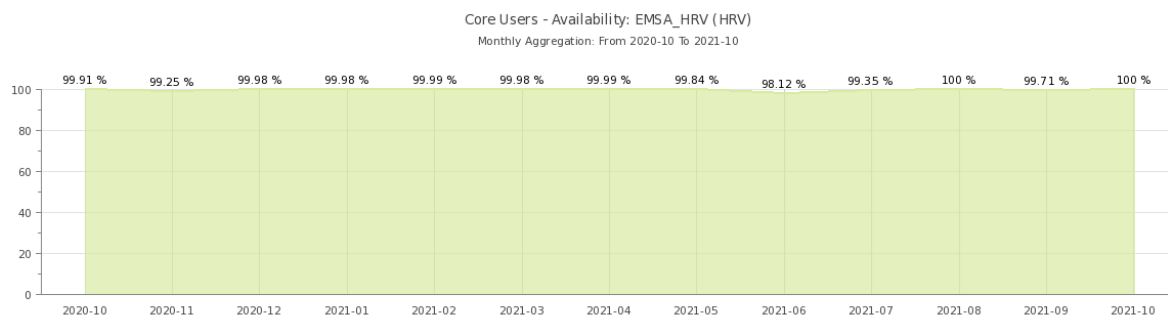
## France



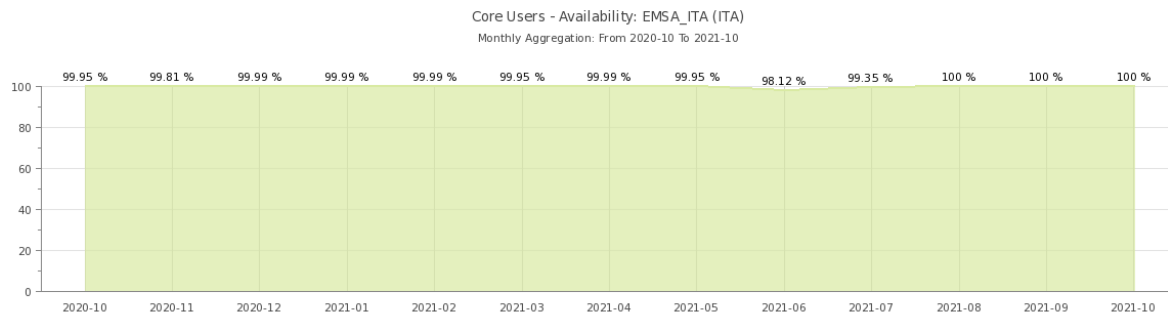
## Gibraltar



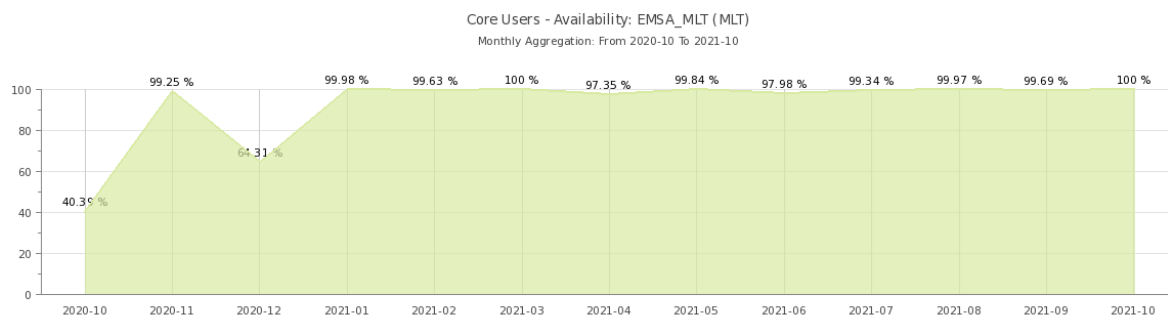
## Greece



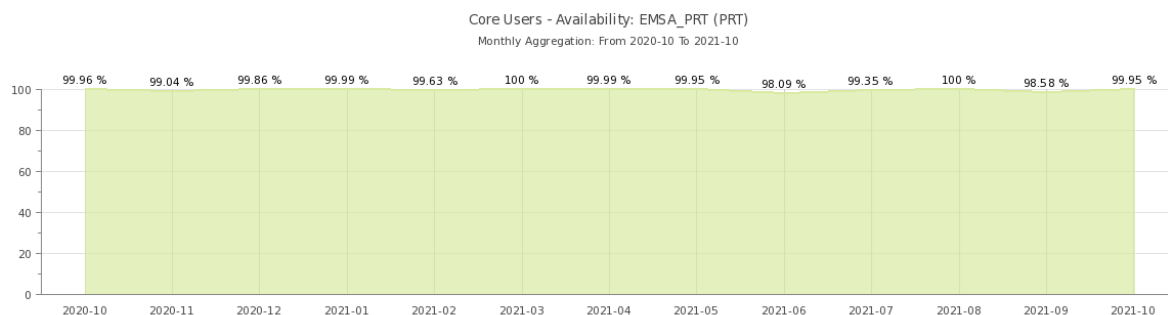
## Croatia



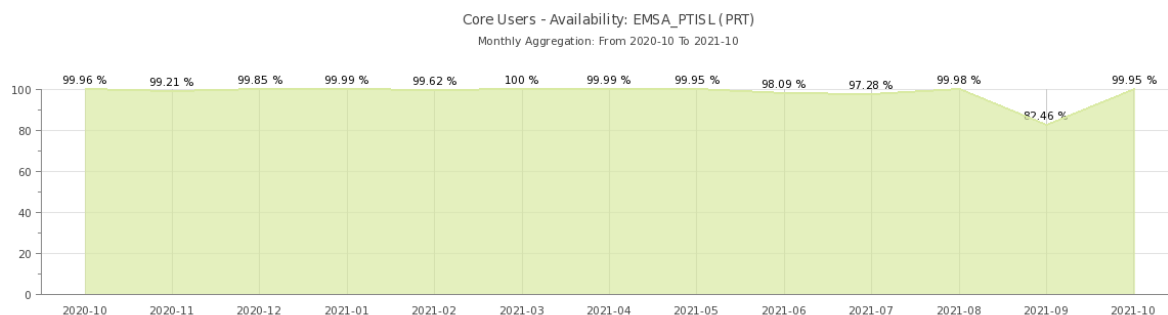
## Italy



## Malta

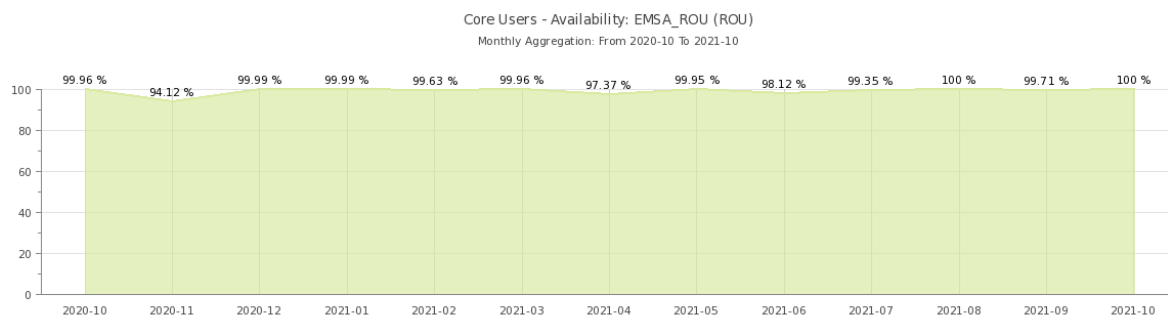


## Portugal (mainland)

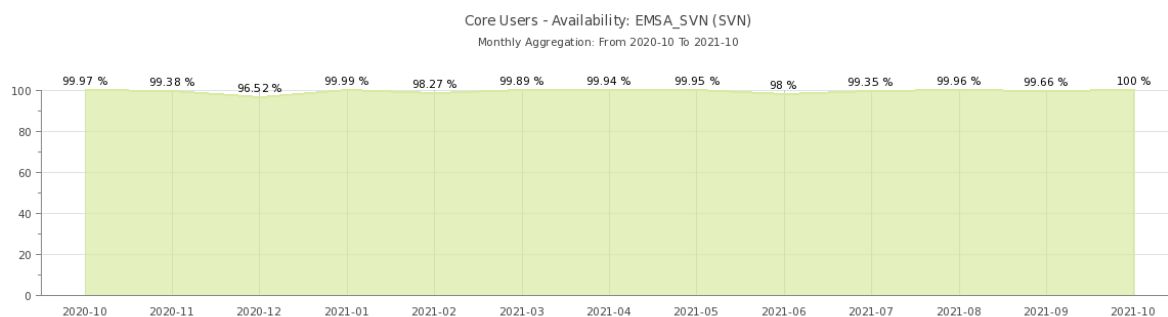


## Portugal (Azores and Madeira)

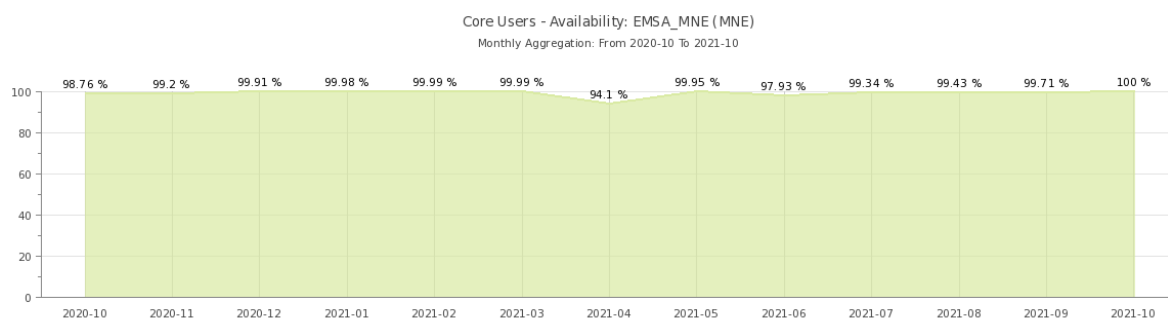




## Romania

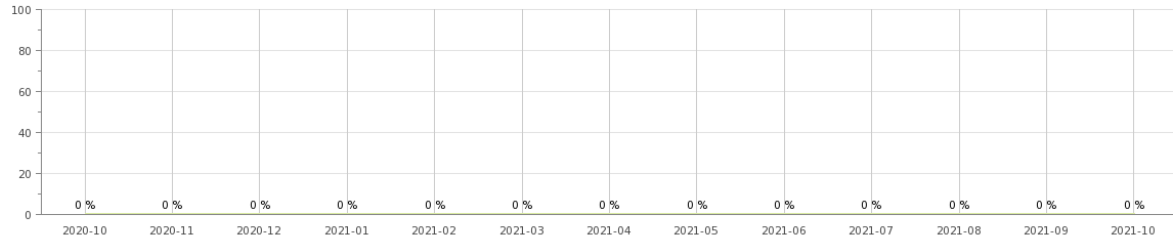


## Slovenia



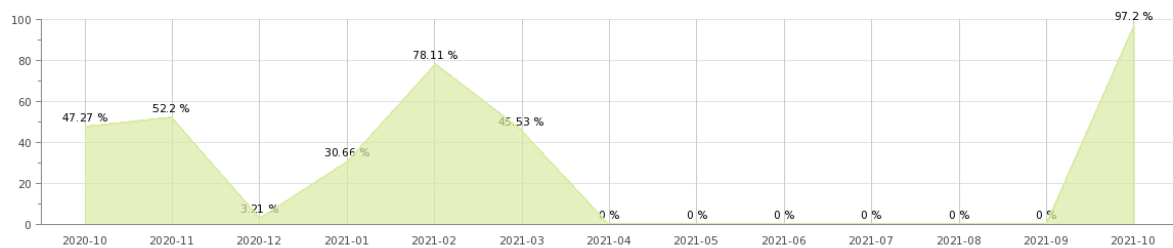
## Montenegro

Core Users - Availability: SAFEMED\_JORDAN (JOR)  
Monthly Aggregation: From 2020-10 To 2021-10



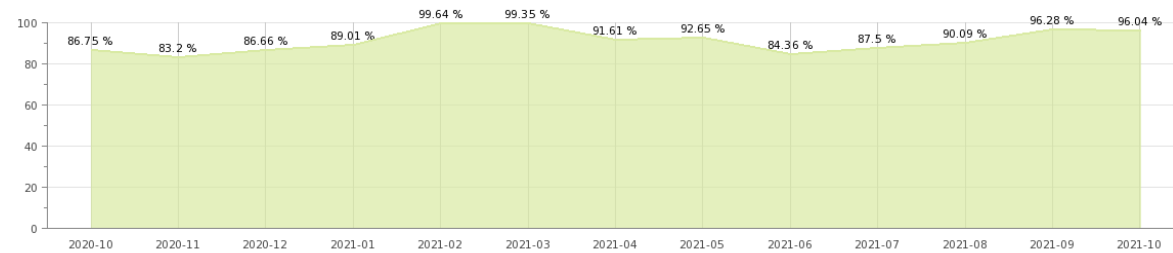
## Jordan

Core Users - Availability: SAFEMED\_MOROCCO (MAR)  
Monthly Aggregation: From 2020-10 To 2021-10

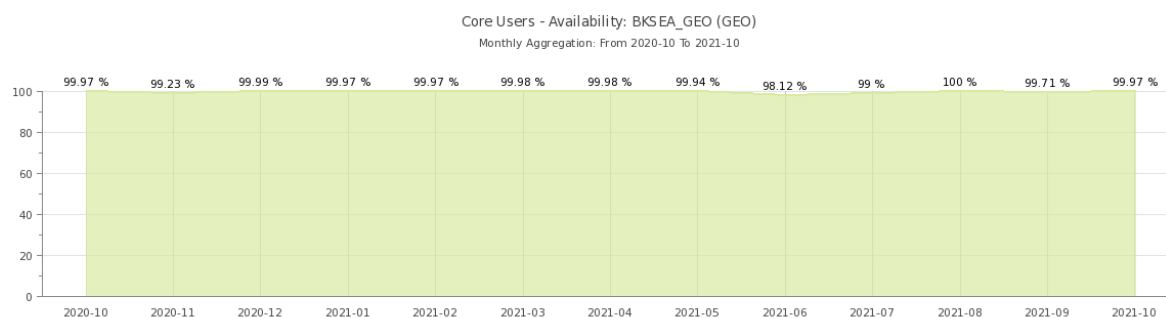


## Morocco

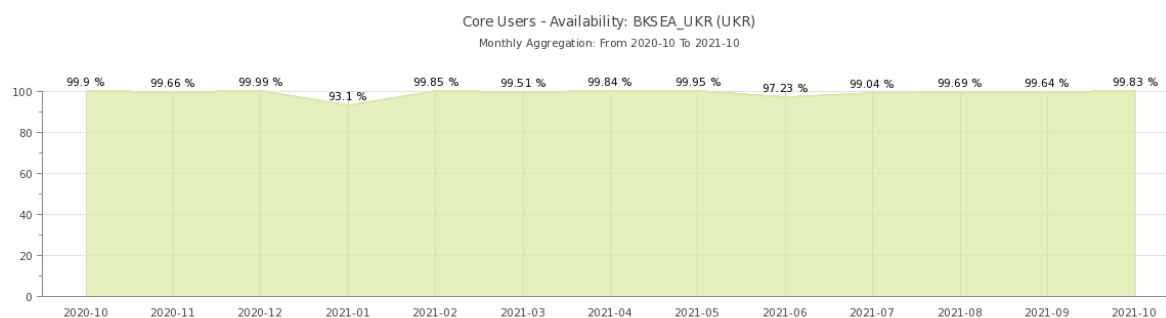
Core Users - Availability: SAFEMED\_TUNISIA (TUN)  
Monthly Aggregation: From 2020-10 To 2021-10



## Tunisia



## Georgia



## Ukraine