

FISHERIES INTELLIGENCE REPORT	
Report ID	GFW-TMT-NWIO-02-2020
Category	IUU Risk Assessment
Issue Date	26 MAY 2020
Receivers	SOM - Somalia Indian Ocean Tuna Commission (IOTC) FISH-i Africa
Region	North West Indian Ocean
Data Sources	AIS (Spire, Orbcomm, ExactEarth) ESA Satellite Optical Imagery ESA Satellite SAR Imagery ICEYE Satellite SAR Imagery Somalia License List IOTC authorisation records TMT internal sources
Time Period	01 January 2019 - 14 April 2020
Security Notes	None
Background Notes	This report has been jointly produced by Global Fishing Watch and Trygg Mat Tracking (TMT) on request of Somalia.

SUMMARY

Since mid 2019 a dramatic increase in Automatic Identification System (AIS) data indicates significant levels of foreign fishing vessel activity that is consistent with fishing operations in the Northwest Indian Ocean (NWIO) region, including on the high seas and inside the Somalia and Yemen EEZs. A small amount of activity was also observed inside Oman EEZ but this is not a focus for this report.

From January 2019 to 14 April 2020, 202 fishing vessels and 146 fishing net markers transmitting on AIS have been identified operating inside EEZs in the NWIO region.

	AIS Type	India	Iran	Pakistan	Sri Lanka	Unknown	Total
High Seas (AOI)	Fishing Vessels	1	150	22	0	0	173
	Net Markers	6	62	15	4	23	110
Somalia EEZ	Fishing Vessels	1	112	10	0	2	125
	Net Markers	3	83	21	1	10	118
Yemen EEZ	Fishing Vessels	1	144	15	0	1	161
	Net Markers	7	64	26	1	9	107

Table 1 - Number of AIS transmissions observed inside the Somalia EEZs
01Jan 2019 - 14 Apr 2020

While these numbers are large, the AIS analysis of the AIS net markers and data from remote sensing techniques in fact suggests the foreign fleets operating in the region are significantly larger than what can be seen from the AIS alone.

The tracks from these AIS transponders are consistent with fishing activity. If no license has been issued to these vessels it indicates that illegal fishing by these fleets is a major concern. These activities threaten food and maritime security in the region and represent a considerable loss of potential revenue to the Coastal States.

The likely fishing gear used by this fleet is pelagic gillnets; these are a high bycatch fishing gear including sharks and turtles. To mitigate this impact on the high seas this gear type is legally limited by IOTC to 2.5 km long; however reports from sources in Pakistan indicate nets are being used that are significantly longer than this. It is not known if Somalia or Yemen has national limitations on these gears, if so then this may constitute further illegal activity. Inspection of these vessels should confirm gear type and include the length of the nets used.

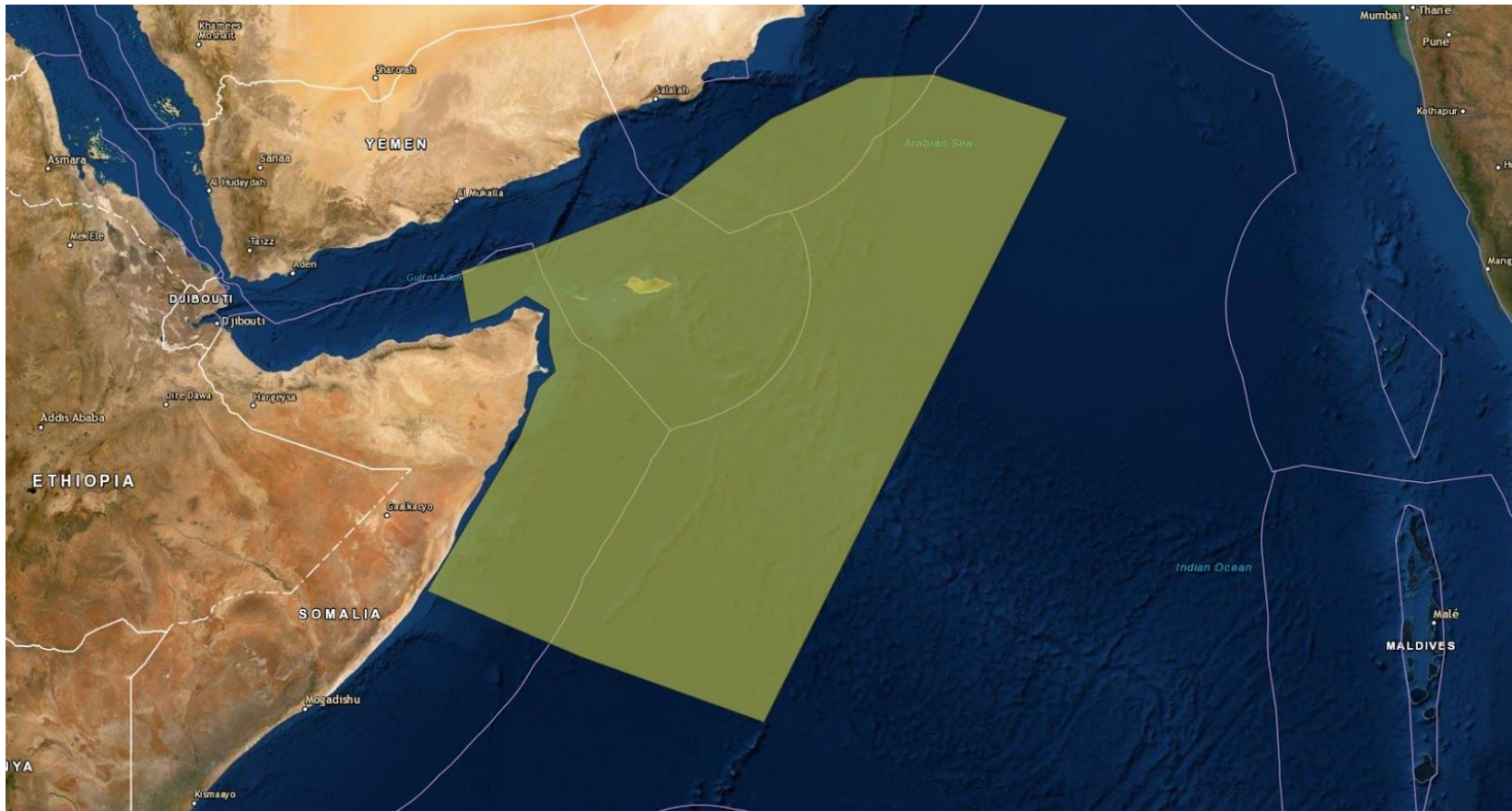


Iranian gillnet fishing vessels in a Berbera port in 2015 (Source C Kilgour)

BROADER ANALYSIS

Area of Interest

The regional Area of Interest (AoI) for the purposes of this report is in the NWIO, and includes parts of the EEZs of Somalia and Yemen, and the adjacent high seas; see map below for detail. Analysis is particularly focussed on potential fishing vessel operations in Coastal State waters. In addition to vessel activity in the AoI, maps and track visuals also provide information on country and/or port of origin. Limited operations were also observed in Oman, but this is not a focus of this report.



Area of Interest in the North West Indian Ocean (NWIO)

AIS Activity

AIS data for the period was obtained from three suppliers, Orbcomm, Spire and ExactEarth. The recent significant increase in activity on AIS by foreign fishing vessels in the region appears to be driven by a trend by Iranian and to a lesser extent Pakistan, India and Sri Lanka vessels installing and using AIS transponders on their vessels and fishing gears. Figure 1 explores the historic activity of the AIS devices active on fishing vessels and fishing gear in the NWIO region. Only a very small proportion have been transmitting on AIS prior to 2019, the majority only started transmitting in mid 2019 and are using Iranian MMSIs¹.

It is important to note that the presence of foreign vessels operating in the Aol is not new; what has changed is the use of AIS which allows a clearer understanding of the scale of activity by foreign fishing vessels.

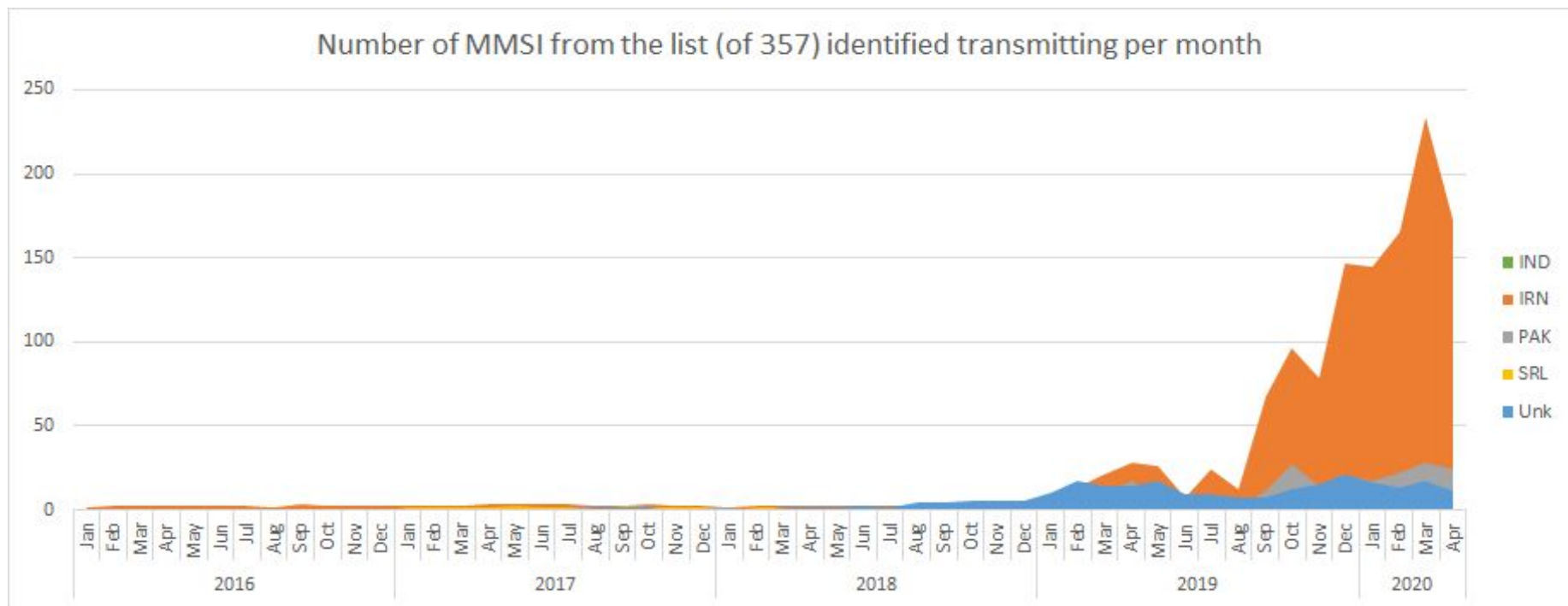


Figure 1 - Monthly count of unique AIS-MMSI transmitting on AIS, from the list of 357 AIS-MMSI from foreign fishing vessels and associated fishing gear observed operating in Somalia and Yemen EEZs in 2019 and 2020. The majority of these AIS transponders only started transmitting in Mid 2019.

¹ AIS transponders operating on Iranian registered vessels should have MMSI numbers starting with 422

The AIS data from these vessels is of a poor quality and provides little information regarding the identity of the vessels. In most cases there is a vessel name but no IRCS (this field often includes CH16 or CH69 referring to radio channels), license number or IMO number. The MMSI numbers however appear to be issued correctly by the flag state in the majority of cases so it is likely that official records in Iran, Pakistan and India exist to help further identify these vessels.

Those that are believed to be fishing vessels have been cross referenced against the Somalia license list and IOTC authorisation record². No vessels appear on either the license list or IOTC authorisation. Vessels authorised by Iran to fish inside the IOTC area do not provide a name but are identified by a 4 digit registration number. Very few of the AIS transmissions include this number so it is difficult to confirm if they are IOTC authorised vessels or not (see section on vessel identity and IOTC authorisation below).

Due to the poor identifier information it is difficult in many cases to confirm if the AIS transmissions are coming from a fishing vessel or an AIS net marker. While there are indicators such as the name or a battery charge level being broadcast in a data field that indicate a likely classification as a net marker or vessel, the MMSI list in Annex 1 and 2 should be treated with caution and further investigation with the flag states is advised.

Iranian Fleet

The Iranian fleet operating in the regional Aol, including inside the Somalia and Yemen EEZs, is significantly larger than the other flag states and consists of 175 individual vessels on AIS that are fishing predominantly in the NWIO beyond the Iranian EEZ. The vessels appear to be originating from and using a number of different ports in Iran including Port Konarak, Bandar-e Jask, Port Tiyab and Ramin. In addition to the fishing vessels, 93 AIS net markers were also linked to Iran. 43 could be matched to vessels transmitting on AIS however 17 transmitted a vessel name that was not matched to a vessel, AIS and the remaining 33 were not broadcasting a discernible name. This suggests that the Iranian fleet operating in the Aol consist of at least 192 vessels.

Iranian vessels observed on AIS transmitted inside the Somalia EEZ for a total of 2533 days between 1 January 2019 and 14 April 2020. Furthermore this fleet transmitted on AIS inside the Yemen EEZ for a total of 2036 days during the same period. The majority of vessels were observed operating at some stage on the high seas. This is a significant amount of fishing effort, however is considered conservative due to the poor signal strength of the AIS transponders on these vessels.³

It should be noted that some of the Iranian vessels' AIS transmissions begin in Karachi Fishing Port in Pakistan. This seems to indicate that a company in the fishing port is the source of the AIS transponders and where they are activated before being delivered to the fishing vessels in Iran.

² No authorisation list for Yemen has been identified

³ These vessels operate class B AIS transponders which have a weaker signal and the satellites prioritise collecting signals from the larger class A transceivers

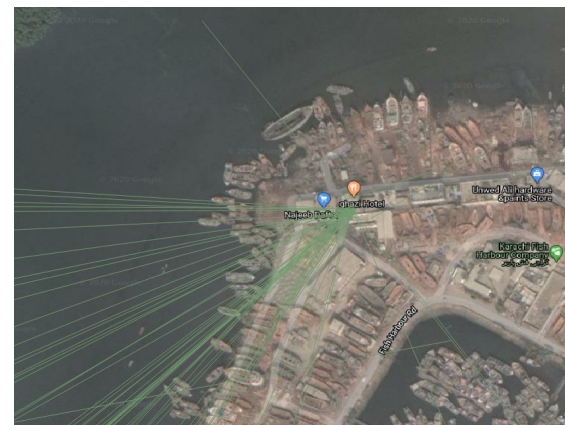
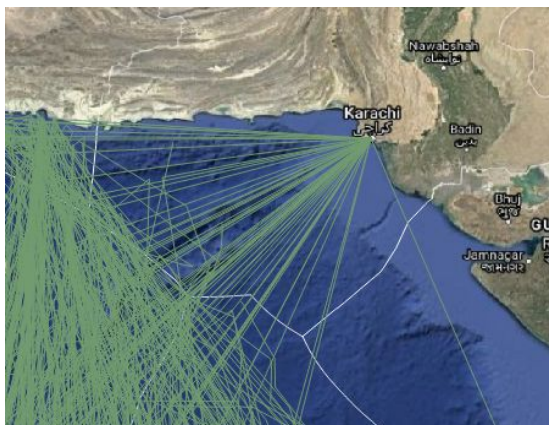


Image showing Iranian vessel tracks starting in Karachi, and the business in Karachi fishing port where the AIS devices likely originate

Indian Fleet

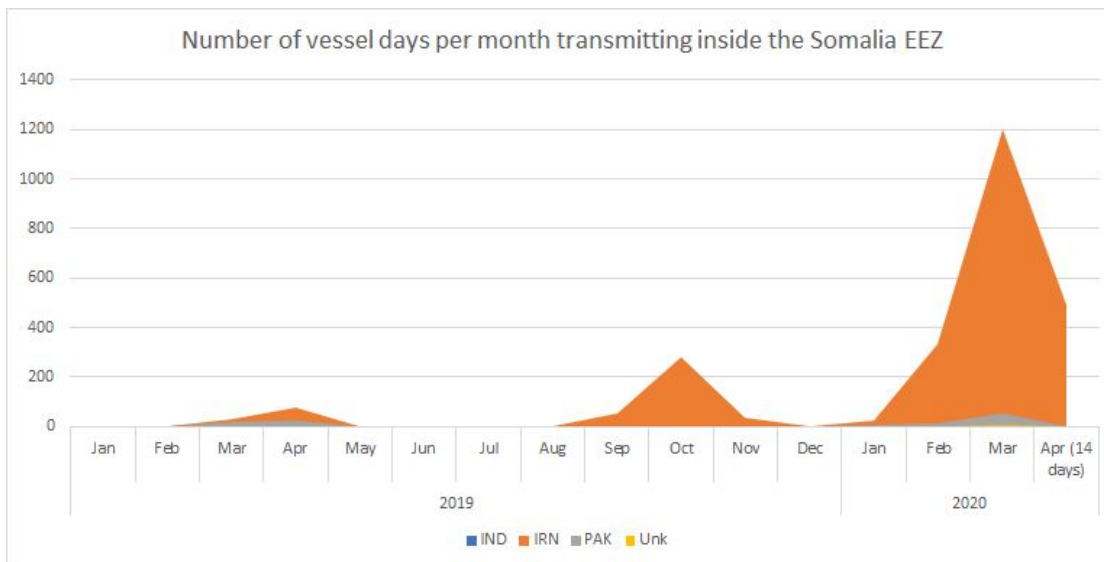
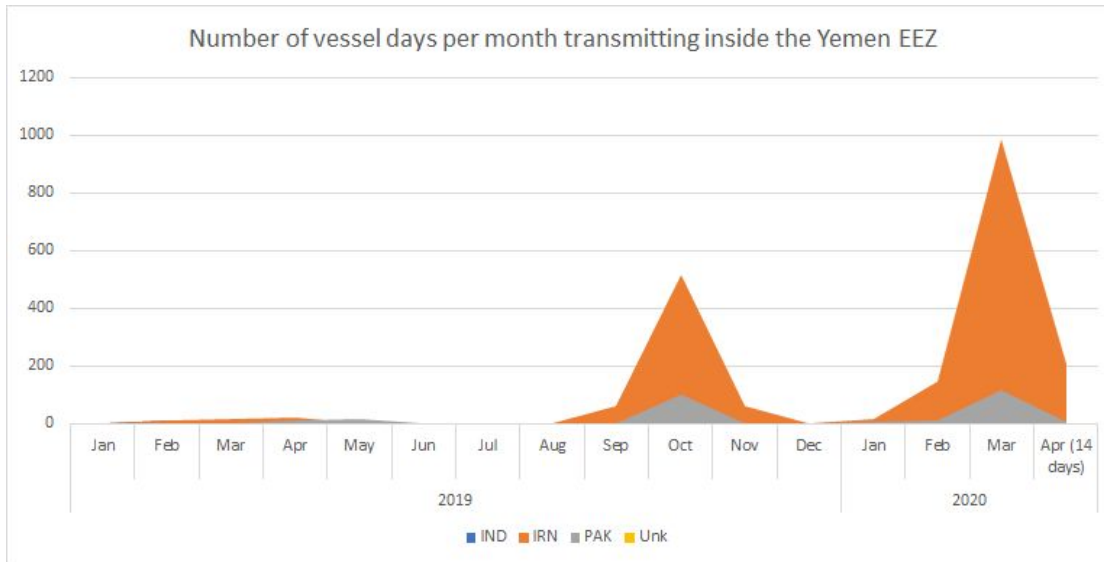
The Indian vessels observed on AIS inside the Somalia and Yemen EEZs operated well inside the EEZs at multiple times throughout the analysis period. The fishing vessel transmitted on AIS on 22 days inside the Somalia EEZ and 72 days inside the Yemen EEZ; all vessels operated at some stage on the high seas. . 6 net markers were also tracked, none of these 6 could be linked to the vessels broadcasting on AIS by the identity details and suggests that at least 5 vessels in total were operating in the Aol. None of the Indian vessels could be found on the IOTC authorisation list.

Sri Lankan Fleet

In total 2 net markers were observed on AIS linked to Sri Lankan vessels, these both broadcast different vessel names which suggests two vessels were active inside the Somalia and Yemen EEZs, during the analysis period. Neither of the vessels linked to these net markers were found on the IOTC authorisation list either.

Unknown Flag State

In addition to the AIS transmissions that could be linked to a flag state there are 2 vessels and 26 net markers using an unauthorised MMSI. These AIS units are broadcasting without a country registered MMSI and sometimes the same MMSI is broadcast from multiple vessels. The two likely vessels only transmitted for a short period inside the Somalia EEZ. The net markers were more active and some can be linked to the Iranian or Pakistan fleets whereas others operated inside the Sri Lankan EEZ suggesting some belonged to Sri Lankan vessels. Requesting these flag states share VMS data from these locations is the only opportunity to identify the vessels responsible.



Vessel Days

To keep the analysis simple, Vessel Days are calculated by how many days each vessel transmitted an AIS signal inside the Somalia and Yemen EEZs.

The analysis shows that the fishing vessel activity peaks in Feb to May and again September to November. These peaks coincide with the Monsoon periods.

The AIS signal quality is poor for these vessels and the satellites do not collect a transmission from these vessels for a number of days. This may result in an under estimate of how many days a vessel was operating inside one of the EEZs.

Iran has significantly more vessel days inside the Somalia and Yemen EEZs during the survey period.

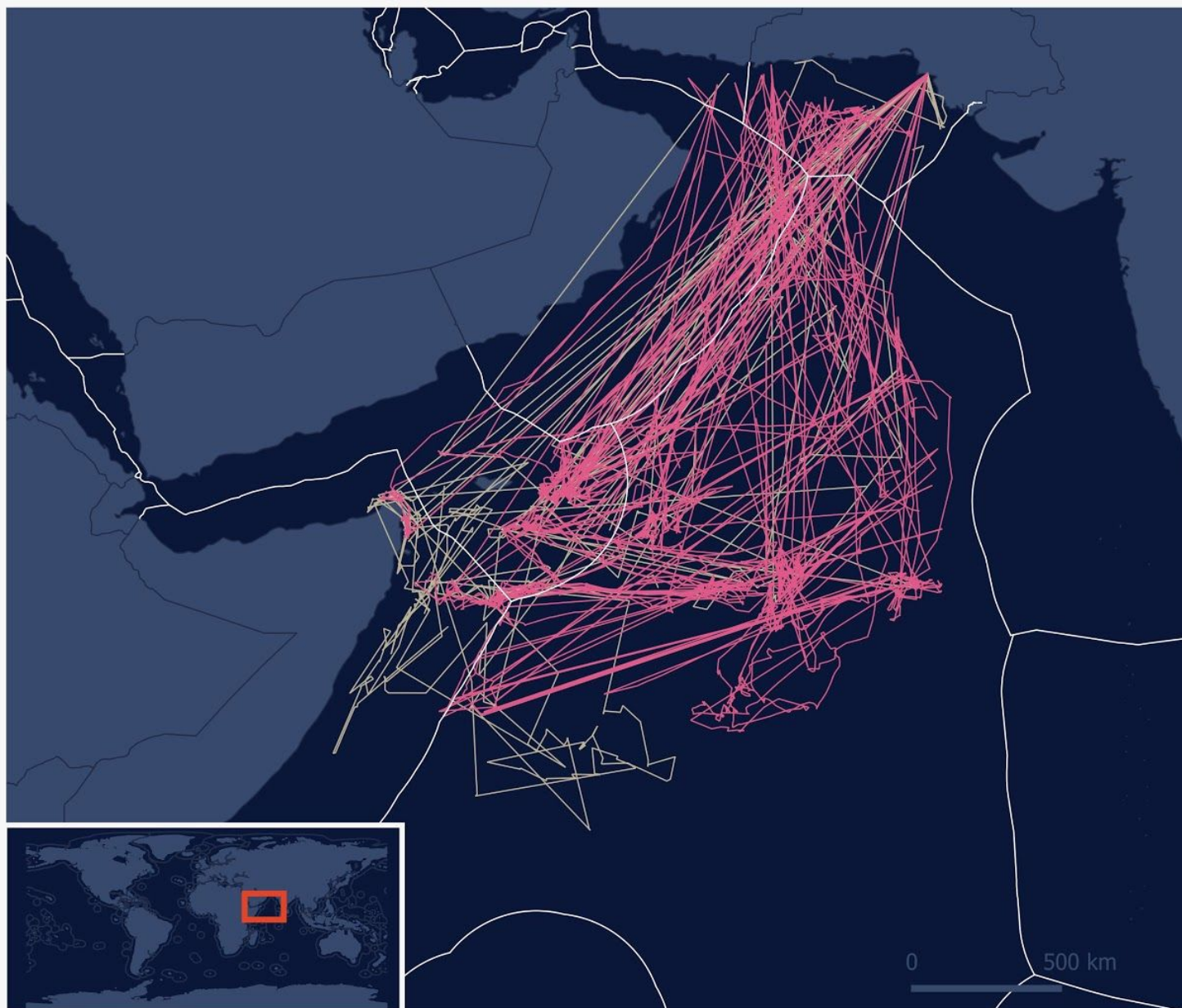
Please see the data annex for vessel deta:
[GFW_TMT_NWIO_01_2020_IdentityData](#)

AIS tracks of fishing vessels and fishing gear linked to Pakistan

Tracks of 25 AIS fishing vessels and 19 AIS fishing net markers linked to Pakistan seen operating in the Area of Interest between 01 Jan 2019 and 14 Apr 2020

The vessel tracks are consistent with fishing behaviour

- PAK Fishing Vessels
- PAK Fishing Gear



AIS tracks of fishing vessels linked to Iran

Tracks of 175 AIS fishing vessels linked to Iran seen operating in the Area of Interest between 01 Jan 2019 and 14 Apr 2020

The vessel tracks are consistent with fishing behaviour

— IRN Fishing Vessels



AIS tracks of net markers (fishing gear) linked to Iran

Tracks of 93 AIS net markers linked to Iran seen operating in the Area of Interest between 01 Jan 2019 and 14 Apr 2020

The tracks are consistent with fishing behaviour by gear

— IRN Net Markers (Gear)

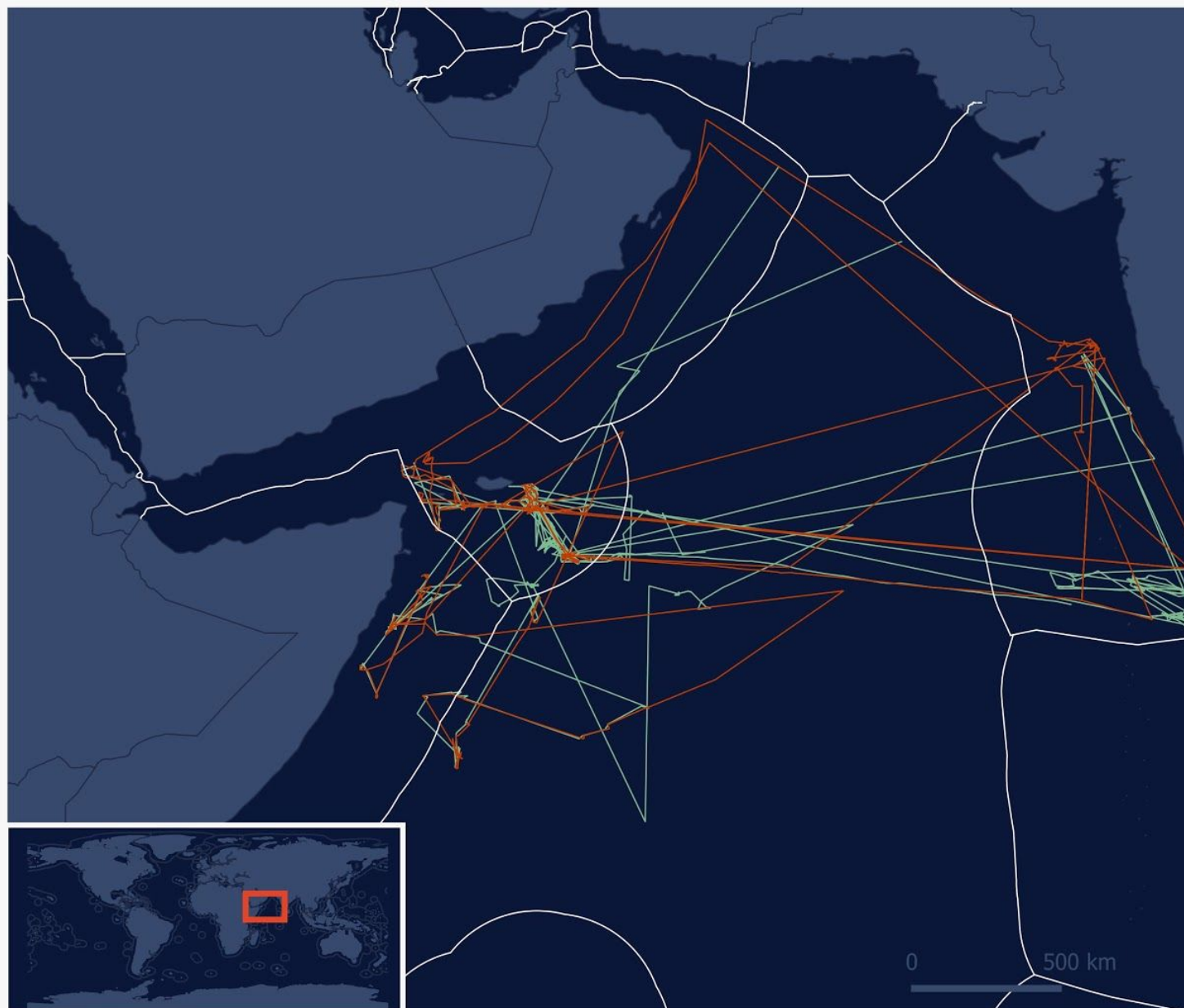


AIS tracks of fishing vessels linked to India

Tracks of 1 AIS fishing vessel and 6 AIS fishing net markers linked to India seen operating in the Area of Interest between 01 Jan 2019 and 14 Apr 2020

The vessel and gear tracks are consistent with fishing behaviour

- IND Fishing Vessels
- IND Net Markers (Gear)



AIS tracks of net markers (fishing gear) linked to Sri Lanka

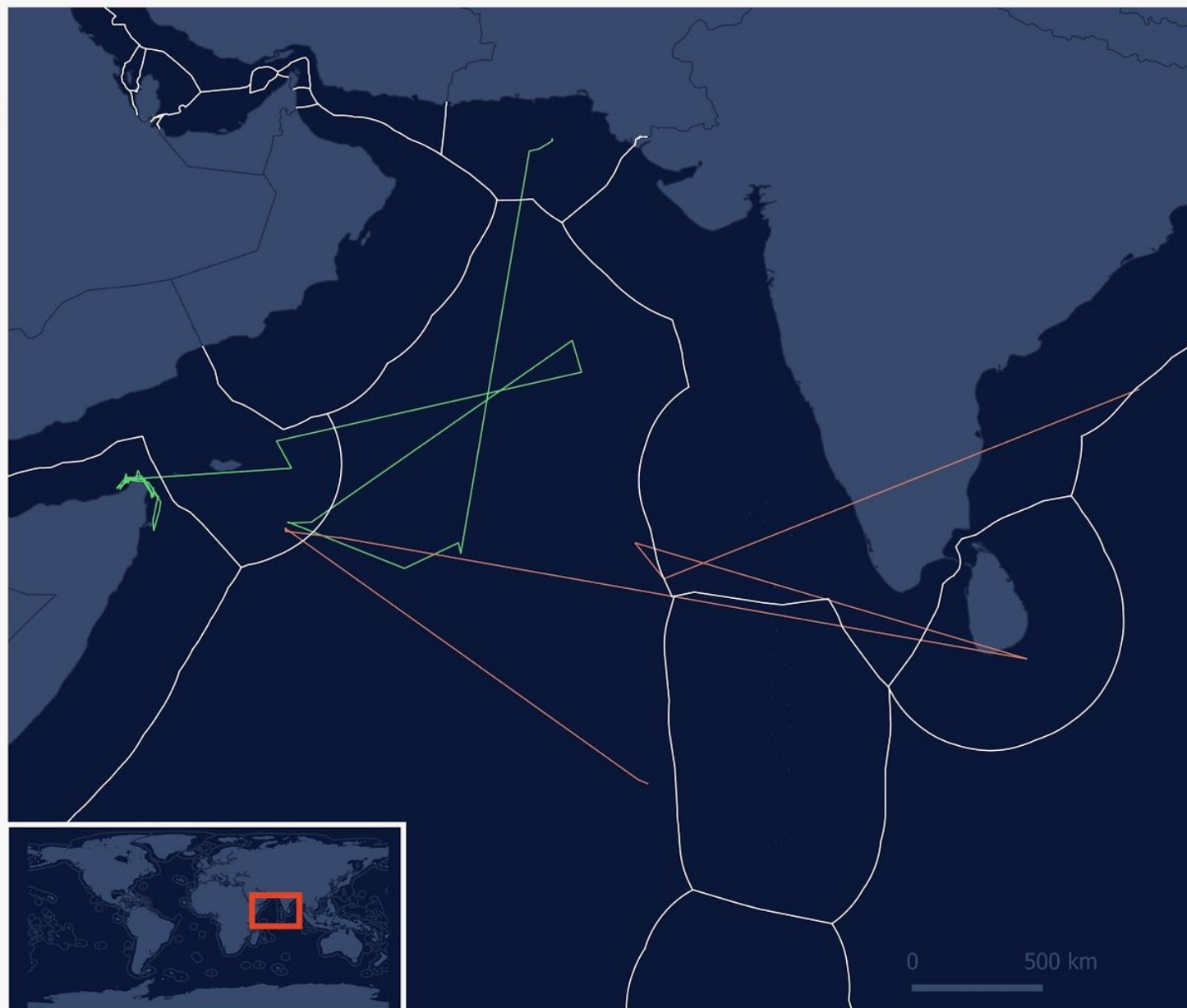
Tracks of 2 AIS fishing net markers linked to Sri Lanka seen operating in the Area of Interest between 01 Jan 2019 and 14 Apr 2020

The gear tracks are consistent with fishing behaviour

SRL Net Markers (Gear)

— 417000249

— 417504988



AIS tracks of fishing vessels and net markers (gear) with no country link

Tracks of 2 AIS fishing vessel and 28 AIS fishing net markers with no country link seen operating in the Area of Interest between 01 Jan 2019 and 14 Apr 2020

The vessel and gear tracks are consistent with fishing behaviour

- UNK Fishing Vessel
- UNK Net Marker (Gear)



Identify and Authorisation Issues

A significant challenge to clear identification of the vessels that are active in the AoI and their authorisation status is the lack of public and transparent information on authorised vessels by any of the indicated Flag States in question. Iran, Pakistan, India and Sri Lanka do not appear to publish lists of registered vessels, or of fishing authorisations.

All four countries are Contracting Parties to the Indian Ocean Tuna Commission (IOTC), and as such are required to submit their lists of vessels authorised to target tuna and tuna-like species annually. However, even here there appear to be deliberate efforts to obscure and limit the information available on the individual vessels. For example, there are 1311 records for Iranian flagged vessels on the IOTC authorisation list; only 11 of these are identified by an individual vessel name. The remainder are only identified by the word 'vessel' and a number designation - for example Vessel 1/1189. The situation for Sri Lanka is similar, where of 1801 records only 28 appear with a vessel name. The remainder are identified by an alphanumeric designation, for example IMULA0001KLT. For both countries, the use of the IOTC designated identity appears to be rarely used in identifiers broadcasted through AIS. It is further reported that IOTC authorisation records for these countries appear to be frequently delayed in submission and out of date.

The vessel identifiers from AIS have been cross-checked against TMT's vessel records in the organisation's fisheries analytical system FACT, which integrates all known public vessel registers and authorisation lists, subscription vessel databases, and non-public sources of vessel data. Very few of the vessel identifiers appear in any other data source. None of the vessels from any of the Flag States appear to have been provided with an IMO number.

This situation makes it extremely difficult for other IOTC contracting parties, coastal States and the broader international community to be able to identify any vessels flying under the Iran, Pakistan, India and Sri Lanka flags, and to determine their authorisation status, making enforcement efforts extremely complicated unless vessels are physically inspected and the authorisation numbers identified.

Nonetheless, it should be noted that the majority of AIS signals from Iran and Pakistan vessels do correspond with national designated MMSI sequences that appear to have been officially provided. This strongly indicates that at the national level there are official vessel lists tied to the MMSIs.

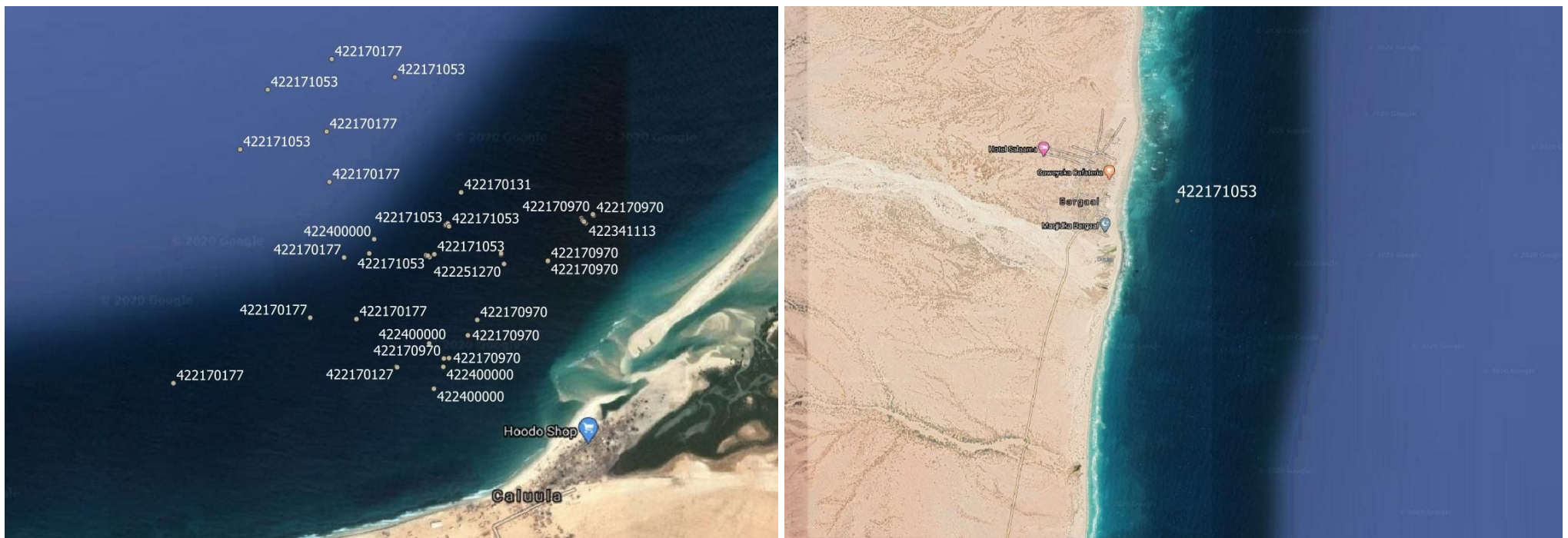
There is a clear need for the vessel identification requirements for IOTC authorisation records provided by contracting parties to be significantly strengthened.

Focus on Somalia

At the request of the Government of Somalia, dedicated analysis on vessel operations inside the country's EEZ has been conducted utilising a range of intelligence sources.

Port Activity in Somalia

Analysis of the AIS data from the Iranian vessels indicates some were using ports in Puntland, potentially for supplies, employing guards and selling fish. Caluula had the most visits throughout the analysis period, Qandala and Bargaal also appeared to be visited. Visits to the ports typically meant anchoring 0.5 to 2 Kilometers from the beach.



Images showing the transmissions from 9 Iranian vessels close to the beach in Caluula and one vessel close to the beach in Bargaal. One vessel (MMSI 422170557) also transmitted from close to the beach in Qandala.

Remote Sensing Data

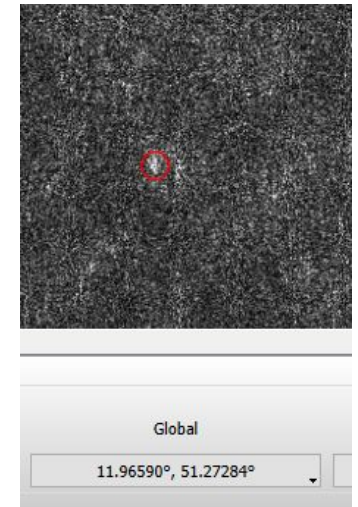
Satellite remote sensing imagery was taken over Somalia waters to support the AIS analysis. The main objective of using multiple data sources is to support the AIS data by showing a vessel was present in the location where the AIS was being transmitted. The second is to match the vessel detections from the images with AIS to estimate the proportion of the vessels using AIS.

All three sources of remote sensing data shown below indicate the presence of 'dark vessels' not broadcasting on AIS and suggests the fleet of fishing vessels in Somalia and Yemen waters is larger than the number of vessels we can see on AIS alone. This finding is consistent with the data from AIS net markers above which indicates 'dark vessels' are present and using AIS fishing gear without an active vessel transponder.

ICEYE High Resolution SAR Imagery

ICEYE is a relatively new satellite company capable of providing a high resolution SAR with a very high confidence of detection vessels with the same profile as a typical gillnet vessel from the region. In collaboration with the Norwegian satellite company KSAT five images were taken between 21 April 2020 and 25 April 2020 around the Horn of Africa where Iranian vessels were operating in relatively high density.

The SAR data when matched with AIS showed 16 of the SAR vessel detections matched with Iranian fishing vessels on AIS. An additional 44 detections matched the profile of an Iranian fishing vessel but did not match with any AIS signals. Matching is made difficult due to the poor quality of the AIS signal from the Iranian vessels AIS transponders; however, a significant number of the detections appeared not to match with AIS. This suggests there are 'dark vessels' present within the Iranian fleet that we are unable to see on AIS.



Example image of a ICEYE SAR detection that matched with MMSI 422170966

ESA Sentinel-1 SAR Imagery

KSAT has provided analysis of available European Space Agency Sentinel-1 SAR data for the region. On 5th, 11th and 12th April 2020 four (4) images over the Puntland coast were taken and all detections of vessels were correlated with AIS signals. The four maps below show the results of this analysis; green points are detections that matched an AIS vessel, the red points are unmatched detections which have no correlated AIS signal.

This analysis matches what was seen on the ICEYE SAR imagery and suggests there are a large number of vessels within the area where Iranian and Pakistan vessels are operating that are not broadcasting on AIS. This corroborates the other data sources, including the AIS gear marker data from the region and the Sentinel-2 optical imagery that the actual size of the foreign feet inside Somalia and Yemen waters is significantly bigger than what is visible on AIS.

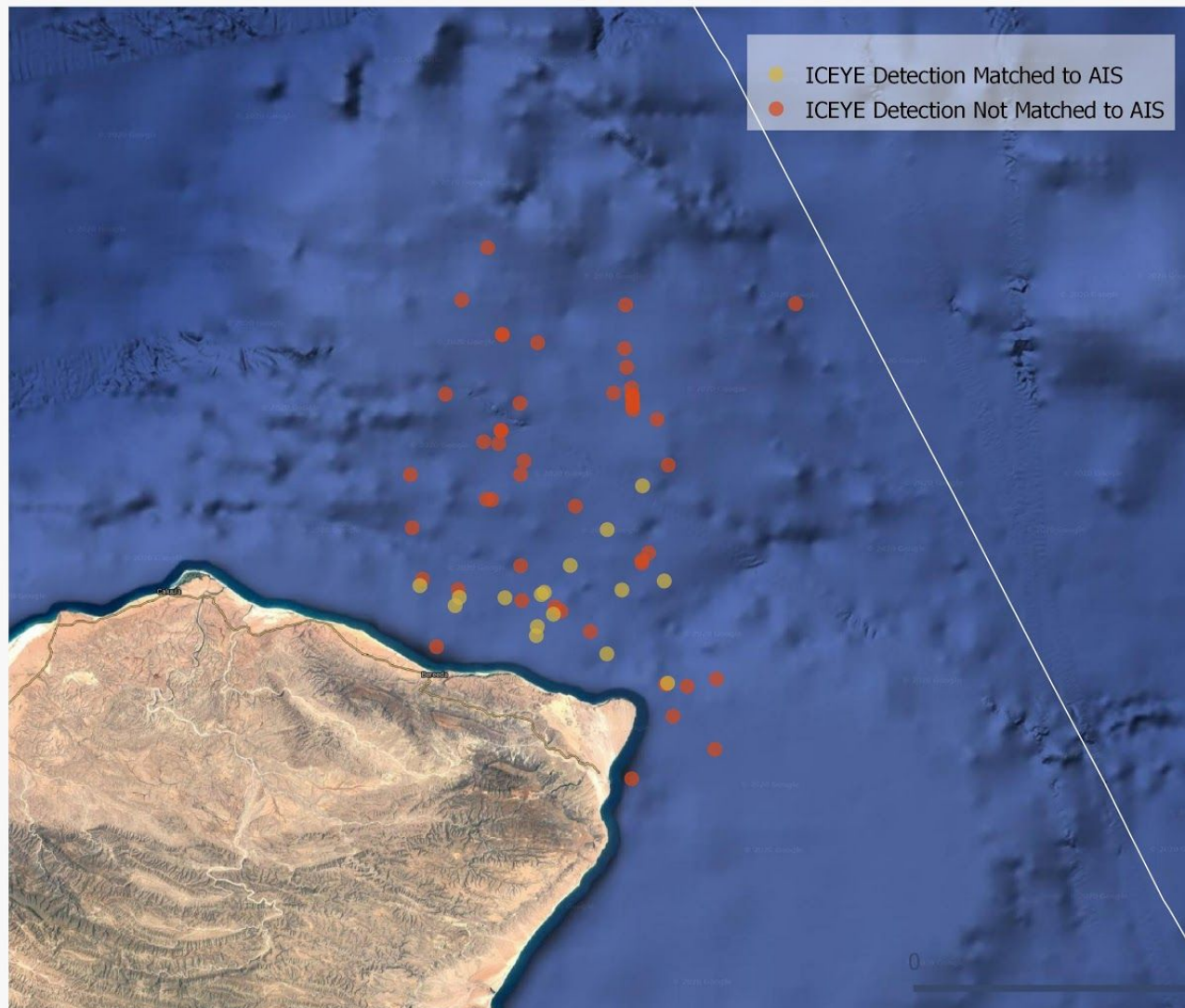
The following 5 images show the vessel detection data from the ICEYE satellites and 4 images from the KSAT Sentinel-1 SAR product taken on 5th, 11th and 12th April 2020

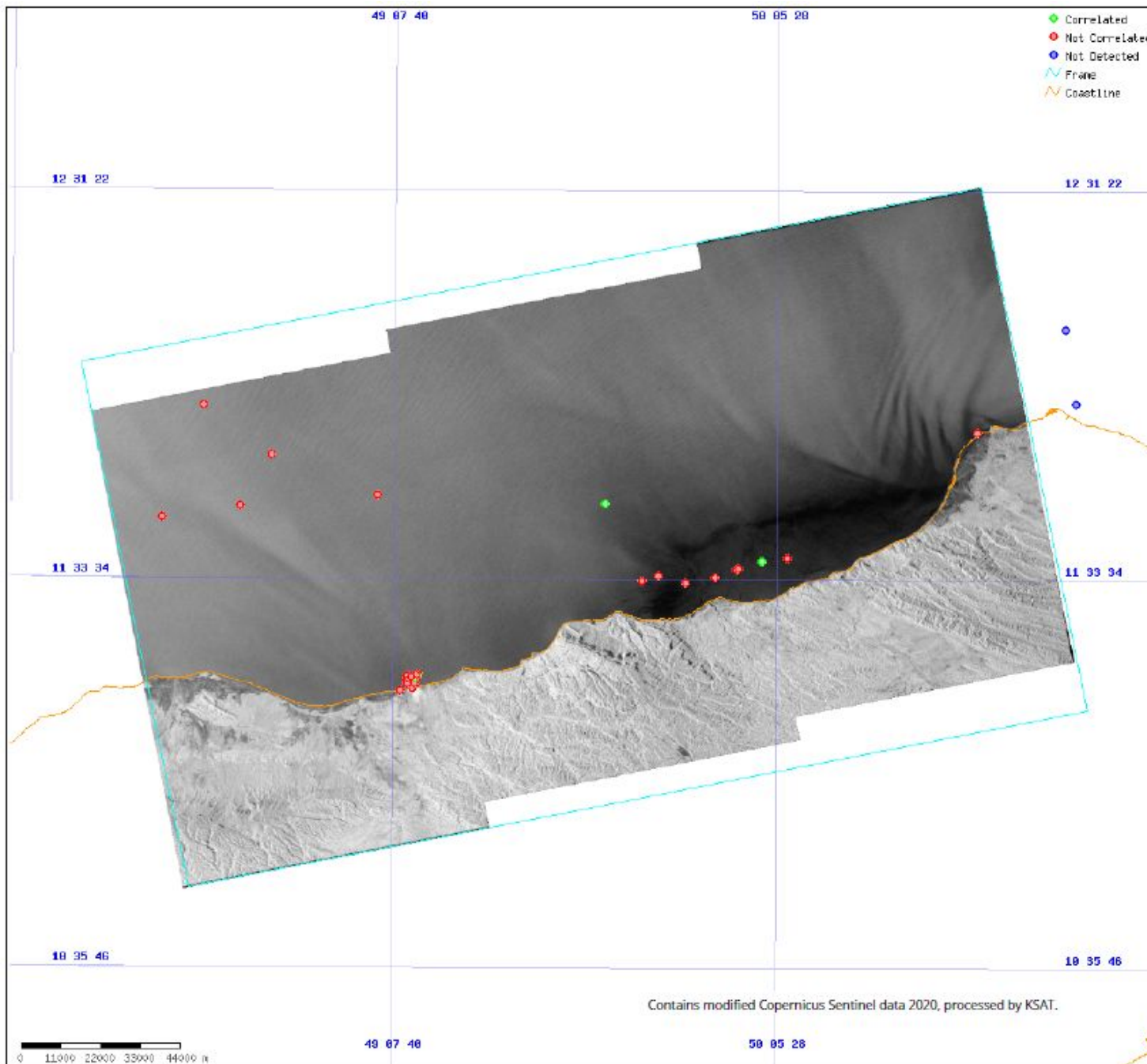
ICEYE High Resolution SAR Imagery

ICEYE SAR imagery taken:

- 21/04/2020 23:52
- 23/04/2020 06:49
- 23/04/2020 18:58
- 24/04/2020 23:49
- 25/04/2020 23:53

A total of 60 vessel detections were made, 16 matched with Iranian fishing vessels broadcasting on AIS and 44 did not match with AIS





KSAT

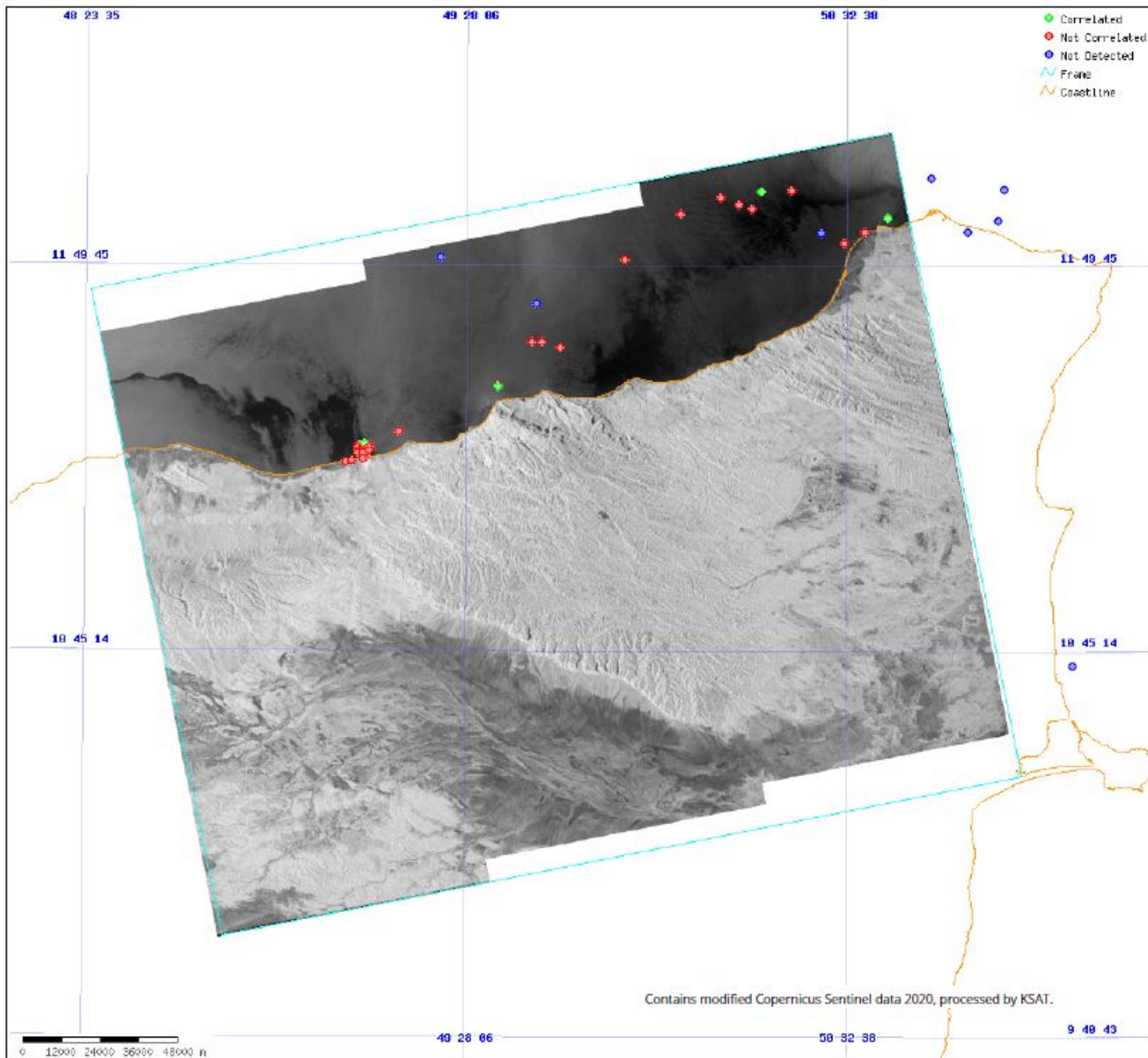
KONGSBERG

KONGSBERG SATELLITE SERVICES

VESSEL DETECTION REPORT

Acquisition Information	
Satellite:	SENTINEL-1A
Sensor:	SAR
Swath:	IW
Polarization:	VV VH
Resolution:	22 m
Incidence angle:	Near: 31° Far: 46°
Acquisition Time:	2020-04-05 14:54:00.1 UTC
Scene coordinates:	12°05'30"N 048°20'16"E 12°31'59"N 050°36'15"E 10°47'33"N 048°37'07"E 11°14'12"N 050°52'24"E
36 Vessels detected	
Correlated :	5 (green)
Only in SAR:	31 (red)
Comment	
N/A	

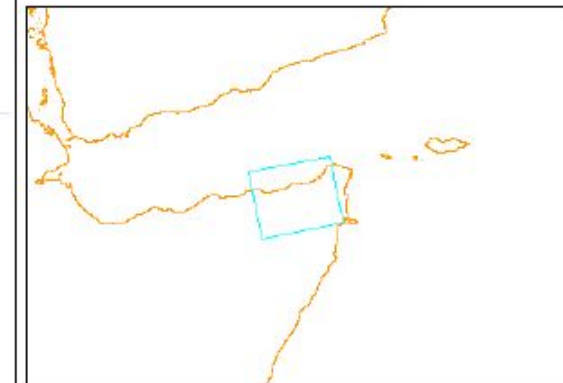
Contains modified Copernicus Sentinel data 2020, processed by KSAT.



- Correlated
- Not Correlated
- Not Detected
- ▭ Frame
- Coastline

KSAT
 KONGSBERG SATELLITE SERVICES

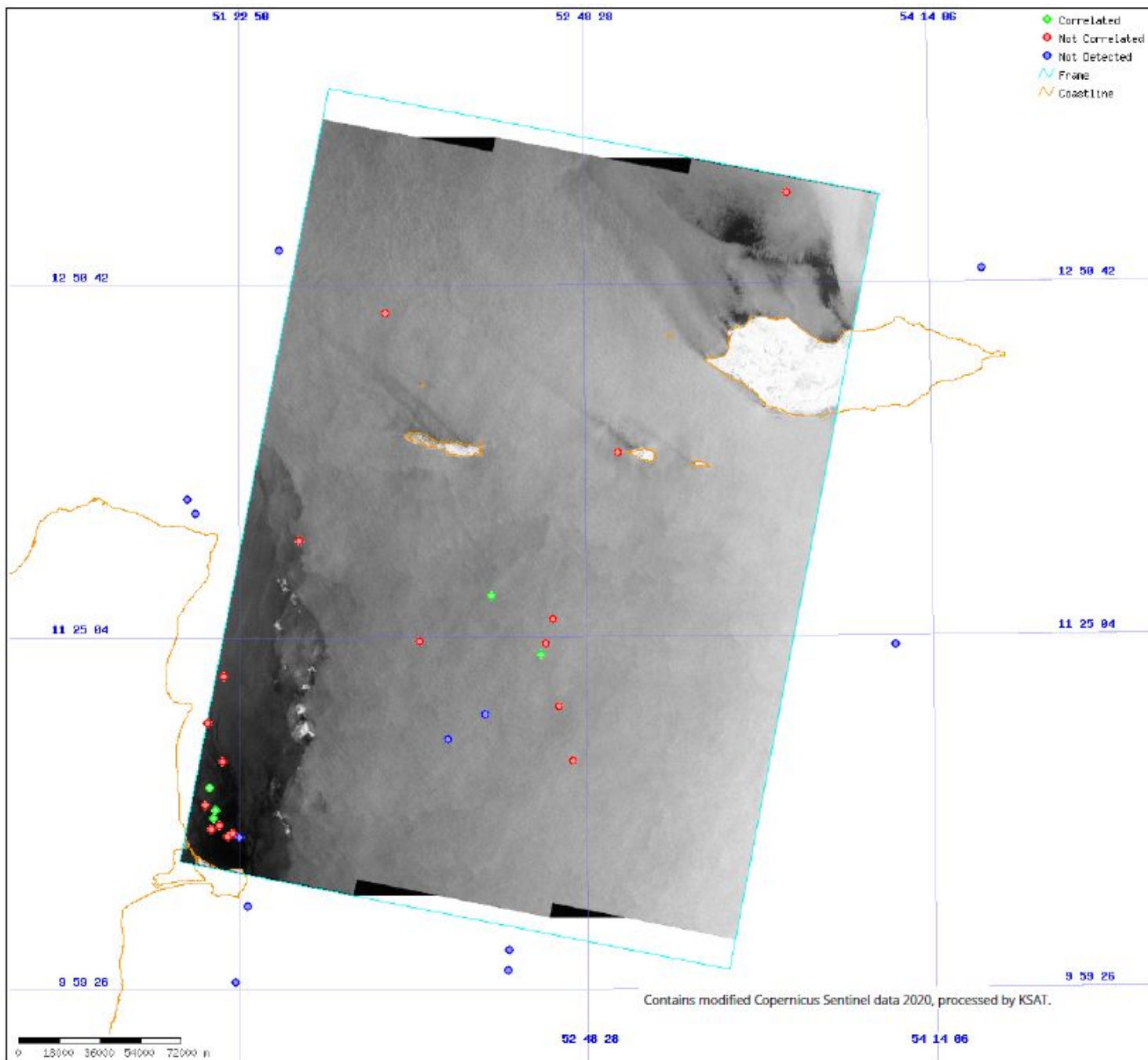
VESSEL DETECTION REPORT



Acquisition Information	
Satellite:	SENTINEL-1B
Sensor:	SAR
Swath:	IW
Polarization:	VV VH
Resolution:	22 m
Incidence angle:	Near: 31° Far: 46°
Acquisition Time:	2020-04-11 14:53:04.7 UTC
Scene coordinates:	11°45'30"N 048°24'25"E 12°12'01"N 050°40'09"E 09°57'28"N 048°47'21"E 10°24'15"N 051°02'12"E
50 Vessels detected	
Correlated :	9 (green)
Only in SAR:	41 (red)
Comment	
N/A	

Contains modified Copernicus Sentinel data 2020, processed by KSAT.





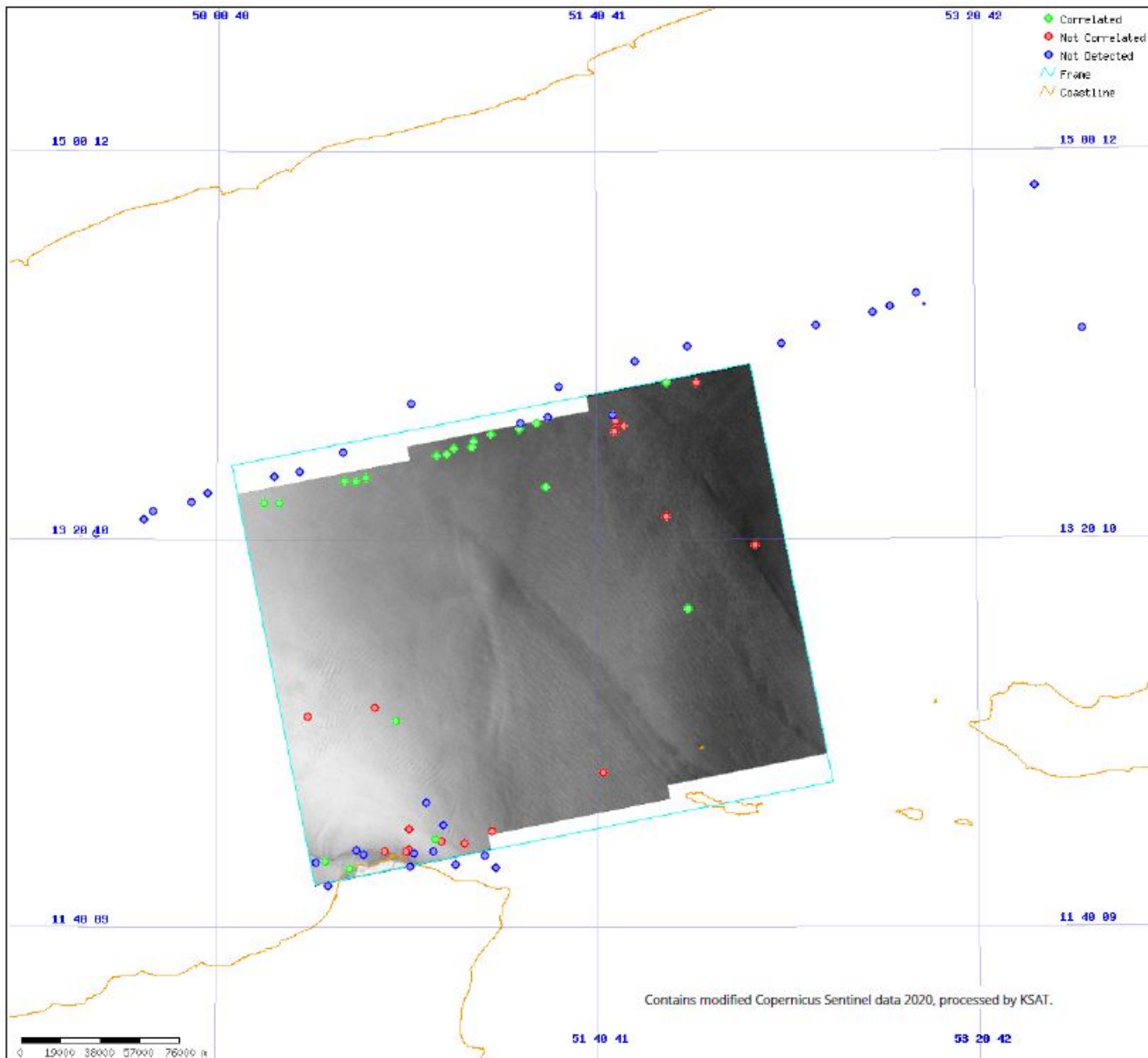
KSAT

KONGSBERG

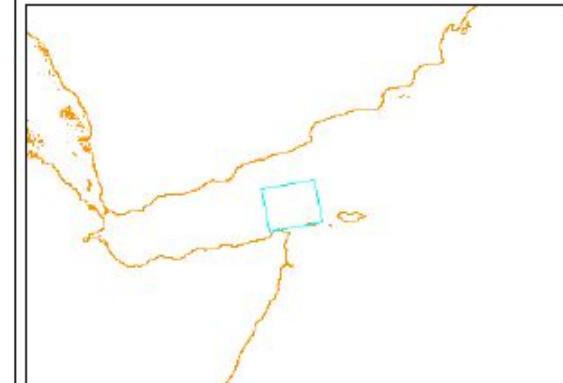
KONGSBERG SATELLITE SERVICES

VESSEL DETECTION REPORT

Acquisition Information	
Satellite:	SENTINEL-1A
Sensor:	SAR
Swath:	IW
Polarization:	VV VH
Resolution:	22 m
Incidence angle:	Near: 31° Far: 46°
Acquisition Time:	2020-04-12 02:18:53.8 UTC
Scene coordinates:	13°38'30"N 051°45'10"E 13°12'11"N 054°01'49"E 10°30'46"N 051°08'10"E 10°03'58"N 053°23'10"E
22 Vessels detected	
Correlated :	5 (green)
Only in SAR:	17 (red)
Comment	
N/A	



VESSEL DETECTION REPORT

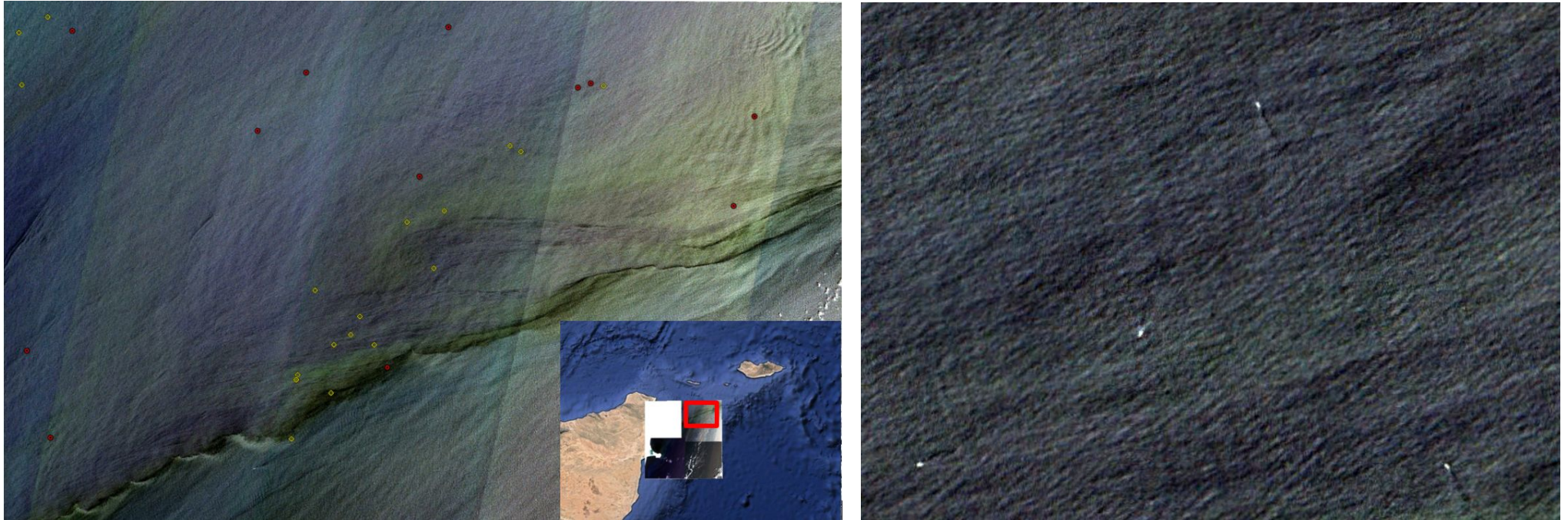


Acquisition Information	
Satellite:	SENTINEL-1A
Sensor:	SAR
Swath:	IW
Polarization:	VV VH
Resolution:	22 m
Incidence angle:	Near: 31° Far: 46°
Acquisition Time:	2020-04-12 14:46:04.2 UTC
Scene coordinates:	13°39'10"N 050°04'28"E 14°05'25"N 052°21'20"E 11°51'04"N 050°26'44"E 12°17'35"N 052°42'34"E
37 Vessels detected	
Correlated :	20 (green)
Only in SAR:	17 (red)
Comment	
N/A	

Contains modified Copernicus Sentinel data 2020, processed by KSAT.

ESA Sentinel-2 Optical Imagery

TMT reviewed samples of ESA Sentinel-2 optical imagery taken in areas of high AIS activity from the Iranian and Pakistan fleets. This analysis also indicates the presence of fishing vessels not broadcasting on AIS.



Optical European Space Agency Sentinel 2 image covering parts of the Somalia/Yemen EEZ, from 6 October 2019 (11:51UTC), detections of small vessels are indicated in yellow points on the left image and visible in the close up image on the right. Overlaid on the image is AIS positions in red received +/- a few hours before and after the satellite imagery. This shows there are less vessels broadcasting on AIS that are visible in the image.

Annex 1 - List of vessels transmitting on AIS

List of foreign⁴ vessels observed on AIS operating inside the Somalia and Yemen EEZ between 01 January 2019 and 14 April 2020. The table includes the number of days where the vessel broadcast on AIS inside each of either Somalia or Yemen's EEZ.

MMSI	Name	Flag	Type	No. Days inside Somalia EEZ	No. Days inside Yemen EEZ
419506164	RAHIM	IND	fishing	22	72
422341629	YOUSEFI	IRN	fishing	26	
422170559	HAMIDI	IRN	fishing	3	52
422170375	WAHIDI-600	IRN	fishing	1	
422341615	UNAVAILABLE	IRN	fishing	13	
422039185	ALYOUSOFMOKHTAR	IRN	fishing	27	6
422201929	AL KHABER	IRN	fishing	14	1
422043818	NASEB	IRN	fishing	11	12
422341328	MALKI	IRN	fishing	7	
422341341	ASHKAN	IRN	fishing	3	2
422219900	MANSORI	IRN	fishing	11	
422341463	MOBIN	IRN	fishing	8	18
422171069	DANIYAL 2	IRN	fishing	18	3
422170240	AL- TAJ	IRN	fishing	22	4
422703104	ALSUDAESIRANI4532	IRN	fishing	29	4
422341147	AL MAZIYAR	IRN	fishing	32	2
422170589	AL AMEER	IRN	fishing	10	28

⁴ The analysis did not include Chinese vessels which operating under a license with Somalia

422341426	FAHAD	IRN	fishing	9	6
422170462	ALZUBAIR	IRN	fishing	18	3
422001814	AL SAJID	IRN	fishing	19	5
422170999	ALYASR	IRN	fishing	28	10
422170959	ARIFI	IRN	fishing	27	3
422341029	ALWALI	IRN	fishing	3	
422720068	AL SAMIYAR KING SEA	IRN	fishing	28	5
422170131	NOMAN	IRN	fishing	19	7
422170631	SH	IRN	fishing	23	13
422043170	AL ROYAL	IRN	fishing	30	2
422341625	PAYAM 2	IRN	fishing	29	5
422341170	MORVARAED2	IRN	fishing	32	3
422120000	AMEER3784	IRN	fishing	7	8
422341207	ALSAAD	IRN	fishing	40	11
422170986	ALOVAYS	IRN	fishing	9	2
422170258	ABDUL HAEE	IRN	fishing	8	14
422252790	BAHRAM	IRN	fishing	28	1
422170592	ALAMERI	IRN	fishing	6	2
422002588	ALRAOOF	IRN	fishing	20	26
422171110	AL MUHAMMADI	IRN	fishing	17	10
422170379	AL HOSENI	IRN	fishing	2	3
422400000	AL FAROQEE	IRN	fishing	38	3
422073243	AMEER HUSSAIN	IRN	fishing	5	24
422170452	RAJABALI	IRN	fishing	6	23
422341424	FAROOQI	IRN	fishing	15	10
422170588	AJ	IRN	fishing	15	1

422341427	MEHRAN	IRN	fishing	11	4
422341419	HG	IRN	fishing	36	1
422110163	EISA SHIPPING	IRN	fishing	29	27
422110165	ARSALAN	IRN	fishing	57	3
422001948	IRFAN (4/3753)	IRN	fishing	35	1
422170960	TAYAB	IRN	fishing	24	8
422222222	Unavailable	IRN	fishing	22	2
422341368	RAKAMERAJ	IRN	fishing	12	14
422170561	NEW AME PAK	IRN	fishing	11	29
422044091	HOSAYNI2	IRN	fishing	38	10
422371333	AL MOHAMMADI	IRN	fishing	9	2
422170163	SERAJMUNEER	IRN	fishing	5	14
422340936	AL NAJIBI	IRN	fishing	21	14
422171096	KARIMBAKSH2	IRN	fishing	16	19
422170557	BAITULLAH	IRN	fishing	54	11
422170478	MEHARSAAM	IRN	fishing	5	6
422341141	ALAEKIMI	IRN	fishing	28	15
422170966	SALMAN	IRN	fishing	33	
422170556	AL NASEEB	IRN	fishing	25	2
422173721	AL NAEEMI 1	IRN	fishing	10	10
422170029	MORTAZA	IRN	fishing	13	11
422950029	MORTAZA	IRN	fishing	15	9
422341425	MUHAMMADI	IRN	fishing	25	15
422170439	AL HARIYA UMAR	IRN	fishing	41	14
422000249	AL FAROQEE	IRN	fishing	24	1
422170425	ARSALAN	IRN	fishing	40	32

422341113	ALHOSAYNI1	IRN	fishing	35	2
422171002	AREF3636	IRN	fishing	12	18
422171109	ALAZYZI	IRN	fishing	26	12
422127404	ALZAID	IRN	fishing	11	9
422170970	ALMOULAI	IRN	fishing	43	4
422171075	AL ISMAEELI 3405	IRN	fishing	14	24
422341131	SIRAJ	IRN	fishing	25	11
422170134	SHAYTH	IRN	fishing	18	40
422171039	ARESH	IRN	fishing	16	27
422251270	Unavailable	IRN	fishing	44	11
422341140	HALIMI	IRN	fishing	30	13
422199120	AMEER3784	IRN	fishing	36	28
422171122	ALMORTAZA	IRN	fishing	23	15
422170552	SOHRABI	IRN	fishing	17	36
422170550	AMDHI][FISNIGBODBABA	IRN	fishing	21	13
422171037	HATEF	IRN	fishing	13	38
422341410	BENYAMEEN	IRN	fishing	19	25
422171098	KARIMBAKSH1	IRN	fishing	16	28
422010133	AL AMEEN	IRN	fishing	29	47
422171053	KOTHAR	IRN	fishing	55	4
422171089	SALMAN	IRN	fishing	11	12
422171072	KARIMBAKSH3	IRN	fishing	21	7
422170127	SHENZHEN-1	IRN	fishing	38	49
422170082	AL KHALIDI	IRN	fishing	26	21
422110164	ALBARNAH	IRN	fishing	30	41
422171112	YAHYA	IRN	fishing	24	17

422171116	MEHRAD	IRN	fishing	33	13
422171038	SALA	IRN	fishing	29	16
422170463	JASM22	IRN	fishing	74	24
422110217	MOSTAFA	IRN	fishing	53	6
422017066	FADA	IRN	fishing	48	26
422170177	WAEHDI3	IRN	fishing	75	26
422171040	ALUBAIDI	IRN	fishing	25	24
422170553	YASEEN	IRN	fishing	65	9
422341373	ZAKIR	IRN	fishing		24
422341348	YASIN	IRN	fishing		12
422107603	Unavailable	IRN	fishing		3
422171025	SEETAP	IRN	fishing		13
422170777	SALMAN-FARSI	IRN	fishing		13
422170143	SAJID USTAD	IRN	fishing		2
422341617	SAJEDI	IRN	fishing	3	3
422171062	SAHIL	IRN	fishing		16
422170362	SAAMIR B 41186	IRN	fishing		18
422341438	RASOOLI	IRN	fishing		2
422341171	POUYA	IRN	fishing	23	2
422171105	NAJIB	IRN	fishing		7
422170560	MUHAMMADI	IRN	fishing		22
422170477	MOULA MADAD	IRN	fishing		15
422156070	MOHAMADI2	IRN	fishing		26
422170256	MASHA-ALLAH	IRN	fishing		11
422170996	MANSOORI	IRN	fishing		20
422171035	MAKORAN	IRN	fishing		5

422000110	MAJEEDI	IRN	fishing		2
422341347	MAJEEDI	IRN	fishing		2
422341203	MAIDI	IRN	fishing		10
422170626	MAAZ	IRN	fishing		8
422341193	MOREDIL ASLAM	IRN	fishing	8	19
422341197	JABER	IRN	fishing	8	1
422341074	HG	IRN	fishing		18
422341136	HG	IRN	fishing	7	1
422341626	HASEEB	IRN	fishing		10
422171004	HAMID 1	IRN	fishing	7	24
422341627	GHAFARI	IRN	fishing		8
422341132	FAROOKE	IRN	fishing		9
422082200	FAOUS QESHM 17	IRN	fishing		1
422341612	EMAD	IRN	fishing		4
422341218	ARVIN2	IRN	fishing	24	1
422341208	ARVIN1	IRN	fishing	24	1
422341340	AMEER HASSAN KREEM	IRN	fishing		7
422341097	AME	IRN	fishing		2
422170232	ALTAYEB	IRN	fishing		
422341398	ALSAHER	IRN	fishing		13
422341900	ALSAFA-1	IRN	fishing		9
422270421	ALSAFA	IRN	fishing		18
422070437	ALMERAJ 3	IRN	fishing		1
422170620	ALHOMAYON	IRN	fishing		24
422341613	ALFAHAD	IRN	fishing		10
422341441	ALEMAD	IRN	fishing		13

422171094	ALE MOHAMMAD	IRN	fishing		21
422170799	AL> HUSSANI	IRN	fishing		15
422170255	AL WAHIDEE : :-)	IRN	fishing		5
422170136	AL SHIFA	IRN	fishing		10
422341205	AL SHABAB	IRN	fishing		15
422170997	AL SAMEER	IRN	fishing		8
422171019	AL SAGEER	IRN	fishing		6
422110162	AL SAAM	IRN	fishing		13
422171102	AL SAAD	IRN	fishing		17
422170344	AL RASHIDI ::: :::	IRN	fishing		3
422170435	AL PARSA	IRN	fishing		25
422170235	AL NAVEED	IRN	fishing		3
422170622	AL MASHALLA	IRN	fishing		10
422170259	AL KHALIL	IRN	fishing		25
422171015	AL KHALIDI	IRN	fishing		13
422171016	AL JABIR	IRN	fishing		15
422341184	AL FAWAD	IRN	fishing		9
422100249	AL FAROQEE	IRN	fishing		6
422171103	AL EMAHD 3959	IRN	fishing		21
422170361	AL ABDULLI B 12819	IRN	fishing		8
422070621	AI WASEEMI	IRN	fishing		9
422170621	AI WASEEMI	IRN	fishing		3
422171090	AHMADI	IRN	fishing		10
422170426	SALMAN	IRN	fishing		8
422170949	ALRAUFI	IRN	fishing	6	17
422171042	ALITTEFAQ	IRN	fishing	13	6

422317107	ALNHEEMI	IRN	fishing		1
422171344	SIKANDAR	IRN	fishing		2
463041331	AI MHEDI I	PAK	fishing	4	14
463156339	AL ARSAM	PAK	fishing	5	11
463071333	AL MOHAMMADI	PAK	fishing	9	11
463170988	AL-FAROOQI	PAK	fishing	6	16
463174032	AL MEHRAN	PAK	fishing	6	15
463041031	AL SALAL	PAK	fishing	14	4
463070958	AL USMANI	PAK	fishing	9	13
463170344	AL MASHALLA	PAK	fishing	7	15
463127404	AL ZAID	PAK	fishing	15	9
463123456	ADNAN	PAK	fishing	40	8
463702917	SALMAN-FARSI	PAK	fishing		23
463170626	MAAZ	PAK	fishing		10
463170559	HAMIDI	PAK	fishing		1
463141341	ASHKAN	PAK	fishing		6
463423456	AL-ZAID	PAK	fishing		1
463770255	AL WAHIDEE 9191B	PAK	fishing		1
463170759	AL TARIQ	PAK	fishing		24
463171011	AL TARIQ	PAK	fishing		4
463170351	AL SALMAN	PAK	fishing		24
463170235	AL NAVEED	PAK	fishing		6
463774032	AL MUBASHIR BFD11731	PAK	fishing		9
463170234	AL MOHAMMADI	PAK	fishing		14
463170562	AL HALIMEE BFD 7710	PAK	fishing		12
463100249	AL FAROQEE	PAK	fishing		2

463170974	ABIDI	PAK	fishing		11
170379	ALHOSENI	Unk	fishing	2	
2461580	ALBOSSRA	Unk	fishing	4	1

Annex 2 - List of AIS Net Markers (fishing gear)

List of AIS fishing gear markers observed operating inside Somalia and Yemen EEZ between 01 January 2019 and 14 April 2020. The table includes the number of days where the vessel broadcast on AIS inside each of either Somalia or Yemen’s EEZ. The expected name of the vessel operating the gear.

MMSI	Name	Expected Vessel Name	Vessel Identified on AIS	Flag	Type	No. Days inside Somalia EEZ	No. Days inside Yemen EEZ
419509682	NOVASARK3 91%	NOVASARK	N	IND	gear	2	17
419507256	ROSARY NET1 91%	ROSARY	N	IND	gear	22	57
419738410	TANUSHRI NET 332%	TANUSHRI	N	IND	gear	0	15
419506950	STSA6468 BOUY4 06%	None	N	IND	gear	0	8
419507257	ROSARY NET2 40%	ROSARY	N	IND	gear	0	39
419507258	ROSAFY NET1 82M	ROSARY	N	IND	gear	0	40
422702890	MUHAMMADI 1 FISH NET	MUHAMMADI	Y	IRN	gear	8	
422702889	ARIFI 2 FISH NET	ARIFI	Y	IRN	gear	4	
422702877	ANWARI FISH NET	ANWARI	N	IRN	gear	2	7
422872935	3!,-!._3803 81%	None	?	IRN	gear	9	
422704057	-%(\$) 1 100%	None	?	IRN	gear	1	1
422703106	SUDAES 1 FISH NET	SUDAES	Y	IRN	gear	13	
422702454	RAJAB ALI 2 FISH NET	RAJAB ALI	Y	IRN	gear	2	
422702869	MUHAMMADI FISH NET	MUHAMMADI	Y	IRN	gear	8	
422704034	MAZYAR FISHBOYA3813	MAZYAR	Y	IRN	gear	2	
422704041	IRFAN FISHBYA/4/3753	IRFAN	Y	IRN	gear	7	
422874010	BOYA _ISMAEELI3405	ISMAELI	Y	IRN	gear	2	10
422702450	ARIF FISH NET 100%	ARIF	Y	IRN	gear	4	3

422702617	ARESH FISH NET 1%	ARESH	Y	IRN	gear	2	1
422704039	-5(!-!\$) &)3(.%4	None	?	IRN	gear	2	1
422874070	!,!(-!\$!\$ 92%	None	?	IRN	gear	1	5
422702894	SOHRABI 1 FISH NET	SOHRABI	Y	IRN	gear	3	4
422702442	RAJAB ALI 1 FISH NET	RAJAB ALI	Y	IRN	gear	4	
422873250	!.!3)2)3420_1 65%	None	?	IRN	gear	2	2
422703262	(/33%).) "/9! 100%	None	?	IRN	gear	22	
422873261	"/9!_(/3!9.)2 72%	None	?	IRN	gear	9	2
422702884	TAYYAB 2 FISH NET	TAYYAB	Y	IRN	gear	11	1
422702481	MASHA A FISH NET	MASHA	Y	IRN	gear	2	
422703073	HARIYA FISH NET	HARIYA	Y	IRN	gear	5	
422702621	ARSALAN FISH NET	ARSALAN	Y	IRN	gear	4	1
422873248	%-!\$3959_2 69%	None	?	IRN	gear	1	4
422702879	REHMATI 2 FISH NET	REHMATI	N	IRN	gear	10	3
422704035	ARIYA FISH NET 4511	ARIYA	Y	IRN	gear	10	
422704052	ARIYA FISH BOYA 4511	ARIYA	Y	IRN	gear	13	
422874079	"/9! !,3!!\$ 74%	None	?	IRN	gear	3	1
422874072	"/9! !,3!!\$ 100%	None	?	IRN	gear	3	1
422545492	JASIM BUOY 2 66%	JASIM	?? JASM22	IRN	gear	7	4
422874005	3!,-!. &)3(.%4_1	None	?	IRN	gear	6	1
422341429	(static missing)	None	?	IRN	gear	23	1
422703065	FAROOQI FISH NET	FAROOQI	Y	IRN	gear	15	3
422874071	!,(!+)-) 84%	None	?	IRN	gear	4	
422703247	TALHA 30%	TALHA	N	IRN	gear	6	3
422702949	NASEEB 1 FISH NET	NASEEB	Y	IRN	gear	1	
422702480	ARSALAN.2. FISH NET	ARSALAN	Y	IRN	gear	7	3

422703990	(!,)-) 2 60%	None	?	IRN	gear	4	
422704013	-!,+) 2 61%	None	?	IRN	gear	8	1
422874015	!,!(-!\$!\$ 15%	None	?	IRN	gear	5	3
422873263	!, !-%2)3733 61%	None	?	IRN	gear	9	2
422702888	ARIFI 1 FISH NET	ARIFI	Y	IRN	gear	18	
422703994	&!2/5+)2 86%	None	?	IRN	gear	9	2
422702620	ARSALAN 2 FISH NET	ARSALAN	Y	IRN	gear	9	3
422702593	SHAHEEN 1 100%	SHAHEEN	N	IRN	gear	9	11
422873252	%-!\$3959_1 77%	None	?	IRN	gear	2	1
422702883	BAITULLA 1 FISH NET	BAITULLA	Y	IRN	gear	9	3
422703985	(!,)-) 1 65%	None	?	IRN	gear	9	3
422545491	JASIM BUOY 1 83%	JASIM	?? JASM22	IRN	gear	16	
422872843	.%4"/9! -/5,! 45%	None	?	IRN	gear	21	
422704030	-!,+) 1 93%	None	?	IRN	gear	11	4
422702618	HATEF FISH NET 45%	HATEF	N	IRN	gear	14	5
422702462	AL TAJ FISHING NET	AL TAJ	Y	IRN	gear	13	2
422702939	"/9! !23,! 23%	None	?	IRN	gear	12	
422874067	!,(!+)-) 90%	None	?	IRN	gear	6	2
422702497	ARSALAN FISH NET	ARSALAN	Y	IRN	gear	13	4
422702622	A HAEE FISH NET	A HAEE	Y	IRN	gear	7	19
422703068	UMEEDI 3 FISH NET	UMEEDI	N	IRN	gear	13	
422702902	AL SHEESH FISH NET	AL SHEESH	N	IRN	gear	10	6
422702892	AHMADI FISH NET	AHMADI	N	IRN	gear	16	5
422873991	&!(!\$_1 100%	None	?	IRN	gear	1	
422873260	-%(2!\$ 67%	None	?	IRN	gear	11	4
422703071	UMEEDI 2 FISH NET	UMEEDI	N	IRN	gear	17	

422703056	UMEEDI 1 FISH NET	UMEEDI	N	IRN	gear	2	
422702615	SALA FISH NET 53%	SALA	Y	IRN	gear	10	3
422702594	AMIN FISH NET 66%	AMIN	N	IRN	gear	17	13
422703051	UBAIDI 2 FISH NET	UBAIDI	Y	IRN	gear	3	
422703230	NAEEMI 55%	NAEEMI	Y	IRN	gear	17	4
422703240	MOHAMMADI FISH NET 1	MOHAMMADI	Y	IRN	gear	12	11
422702387	AL PARSA BOYA 71%	AL PARSA	N	IRN	gear	24	1
422702895	KHALIDI KAMBELI 2	KHALIDI	Y	IRN	gear	19	5
422702395	FAROOQ FISH BOYA	FAROOQ	Y	IRN	gear	21	16
422702425	AMEER FISH BOYA	AMEER	Y	IRN	gear	15	21
422874063	..!+(\$! !(-!\$ 21%	None	?	IRN	gear	20	
422873269	/6)3_777 70%	None	?	IRN	gear	11	
422703249	UZAIRI FISH NET	UZAIRI	N	IRN	gear	16	3
422702595	SHAHEEN2FISH	SHAHEEN	N	IRN	gear	27	8
422145098	DANIYAL1 BUOY NO2	DANIYAL	Y	IRN	gear	27	2
422511463	WANGBIAO-1 58%	WANGBIAO	N	IRN	gear	1	5
422702881	TAYYAB 1 FISH NET	TAYAAB	Y	IRN	gear	5	
422703105	SUDAES 2 FISH NET	SUDAES	Y	IRN	gear	6	1
422702882	SOHRABI 2 FISH NET	SOHRABI	Y	IRN	gear	0	2
422513607	SAAMIR FISH NET	SAAMIR	Y	IRN	gear	0	9
422703091	KHALIDI FISH NET	KHALIDI	Y	IRN	gear	0	1
422703089	JABBAR FISH NET	JABBAR	N	IRN	gear	0	2
422703243	AMEER HUSSAIN F NET	AMEER	Y	IRN	gear	1	4
422702484	AL SAFA FISH NET	AL SAFA	Y	IRN	gear	0	5
422702386	AL PARSA BOYA 100%	AL PARSA	N	IRN	gear	0	4
422702619	AL KHALIL FISH NET	AL KHALIL	Y	IRN	gear	0	1

422872945	#B(!.Q4(D8SI,	None	?	IRN	gear	0	7
422874001	"/9! 4!(! 70%	None	?	IRN	gear	0	1
422873254	!,% -(!--!\$ 94%	None	?	IRN	gear	0	1
463702492	WALEED FISH NET	WALEED	N	PAK	gear	2	2
463704046	!,-(!-\$!.) &)3(.%4	None	?	PAK	gear	1	3
463702394	SUDES Z 89%	SUDEZ	Y	PAK	gear	2	
463702918	ZAID FISH NET 66%	ZAID	Y	PAK	gear	5	2
463703997	AIS BUOY-3997 42%	None	?	PAK	gear	6	8
463702393	MUSTAFA FISH BOYA	MUSTAFA	N	PAK	gear	10	5
463704026	9937.81	None	?	PAK	gear	23	1
463702943	AIS BUOY-2943 81%	None	?	PAK	gear	13	7
463004836	AL AMARAT76%	AL AMARAT	N	PAK	gear	21	3
463004785	AL ISLAM43%	AL ISLAM	N	PAK	gear	24	15
463004746	AL TAMASH04%	AL TAMASH	N	PAK	gear	47	1
463702494	WAHIDEE FISH NET	WAHIDEE	Y	PAK	gear	0	2
463703098	SIKANDARIA FISH NET	SIKANDRIA	N	PAK	gear	0	1
463702436	SALMAN FISH BOYA	SALMAN	Y	PAK	gear	0	1
463702404	RASHIDI FISH BOYA	RASHIDI	Y	PAK	gear	0	1
463702599	IDREES FISH NET	IDREES	N	PAK	gear	0	1
463000001	ASAD SHARAFAT 49%	ASAD SHARAFAT	N	PAK	gear	0	1
463702493	AIS BUOY-2493 18%	None	?	PAK	gear	0	8
463510745	AIS BUOY-0745 100%	None	?	PAK	gear	0	16
417000249	SADUN NET2 11.0V	SADUN	N	SRL	gear	33	5
417504988	JAYAHASAN F NET(A)	JAYAHASAN	N	SRL	gear	0	8
123006513	ALROYAL NET MARK287%	AL ROYAL	Y	Unk	gear	14	3

123008804	AL KHABER BOYA 0199%	AL KHABER	Y	Unk	gear	21	
123008892	AL KHABER BOYA 0298%	AL KHABER	Y	Unk	gear	25	
123004788	AIS NET MARK84%	None	?	Unk	gear	24	3
123004539	AL USMANI66%	AL USMANI	Y	Unk	gear	15	10
123004842	AIS NET MARK49%	None	?	Unk	gear	33	1
123008877	ALROYAL NET MARK_85%	AL ROYAL	Y	Unk	gear	43	5
168802084	BUOY-02 100%	None	N	Unk	gear	57	
20850032	RUSIRI DUWA 1 NET 2	RUSIRI DUWA	N	Unk	gear	0	2
91805089	RANMINA-NET5	RANMINA	N	Unk	gear	0	6
91804423	RANMINA-NET4	RANMINA	N	Unk	gear	0	9
150000331	RANMINA-NET3	RANMINA	N	Unk	gear	0	6
9204094	RANMINA NET 2	RANMINA	N	Unk	gear	0	8
9204105	RANMINA NET 1	RANMINA	N	Unk	gear	0	5
71113041	NILNETHU -2 (F)	NILNETHU	N	Unk	gear	0	10
98508340	NILNETHU -2 (C)	NILNETHU	N	Unk	gear	0	9
98508344	NILNETHU -2 (B)	NILNETHU	N	Unk	gear	0	9
98508341	NILNETHU -2 (A)	NILNETHU	N	Unk	gear	0	3
91804003	ENOKSHI7-NET4	ENOKSHI	N	Unk	gear	0	
98508304	DILARA 3 NET (A)	DILARA	N	Unk	gear	0	1
912467887	DIANA NET 262%	DIANA	N	unk	gear	0	13
918234558	DIANA NET 169%	DIANA	N	unk	gear	0	16
40829032	DEVSHRITHA NET (C)	DEVSHRITHA	N	Unk	gear	0	2
30829032	DEVSHRITHA NET (B)	DEVSHRITHA	N	Unk	gear	0	2
20829032	DEVSHRITHA NET (A)	DEVSHRITHA	N	Unk	gear	0	1
123004808	AL UMEED FISH43%	AL UMEED	N	Unk	gear	0	3

Annex 3 - Data Files

Accompanying this report is three data files:

<i>GFW_TMT_NWIO_01_2020_AISdata</i>	This represents the AIS data for the vessels and net markers used in this analysis
<i>GFW_TMT_NWIO_01_2020_EntryExitData</i>	The dates when each MMSI identified in this analysis entered and exited the Somalia or Yemen EEZ
<i>GFW_TMT_NWIO_01_2020_IdentityData</i>	List of all the vessels identified in Somalia and Yemen EEZs with monthly count of days transmitting inside each EEZ

For further information please contact:

Global Fishing Watch - Charles Kilgour charles@globalfishingwatch.org

Trygg Mat Tracking - Duncan Copeland dcopeland@tm-tracking.org

The quality of data used for this report is good but not 100%, particular in regard to the AIS data and identity of the vessels. Confirmation by the flag state is recommended for final identification of vessels for any future actions against them and their owners.

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