Traffic Density Mapping Service

User Guide

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Document History

Version	Date	Changes	Prepared
1.0	10/10/2019	Initial version of the TDM Service	EMSA
1.1	17.03.2022	Amended draft version. Includes TDMS-2 developments	EMSA
1.1.1.	08.08.2022	Revised version	EMSA
2.0	22.01.2024	Version of TDMS-2 service (Final version)	EMSA

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List of Abbreviations

Abbreviation	Explanation
AIS	Automatic Identification System
INSPIRE	INfrastructure for SPatial Information is the Directive 2007/2/EC regarding spatial data and supporting the creation of policy relating to the environment.
EMSA	European Maritime Safety Agency
EU	European Union
SAI	Specific area of interests defined by the users
SEG	SSN Ecosystem Graphical Users Interface
SSN	SafeSeaNet
TDM	Traffic Density Map
VTMIS	Vessel Traffic Monitoring Information System

1. Purpose of the document

This document is a user guide for the Traffic Density Mapping service. It provides a general description of Traffic Density Maps (TDM) and explains how they can be displayed in the SafeSeaNet Ecosystem's Graphical user interface (SEG).

This document is available on EMSA's website: https://emsa.europa.eu/ssn-main/documents.html

2. Background

2.1 Concept

TDMs are a simple and effective way of displaying vessel movement patterns and contribute to a better understanding of maritime traffic, locations of the main shipping lanes and of ship types navigating on routes.

The method used to generate TDMs is the "**ship routes restoring method**". This method rebuilds the track of each distinct ship from the recorded positions and counts how many routes are crossing each cell of a grid during a given period of time. This method can be implemented in all regions (coastal and open sea), using all the available ships position data available to EMSA and allows connecting routes even within areas with a low coverage.

TDMs are calculated from historical Terrestrial and Satellite AIS ships position data covering EU coastal areas as well as open sea areas outside the Terrestrial AIS coverage.

The following types of TDMs are available:

- Standard,
- Comparative,
- Vector, and
- Detailed.

2.1.1 Standard TDMs

Standard TDMs are created for each of the following predefined areas:

- Baltic Sea
- North Sea/North Atlantic
- Atlantic
- Mediterranean Sea
- Black Sea
- All Europe (i.e. including all the above areas)





Figure 1: TDMS areas



Figure 2: TDMS areas

Standard TDMs are calculated for the following time periods:

- **Month** presents the data collected during a calendar month, from the first day until the last day of the corresponding month.
- Season presents the data collected during the following periods:
 - Spring (period: March, April, May)
 - Summer (period: June, July, August)
 - o Autumn (period: September, October, November)
 - o Winter (period: December, January, February)
- Year presents the data collected during a calendar year.

The basic period for the Standard TDM is one month. The monthly maps are combined in order to create seasonal or annual TDMs. All calculations are provided for the preceding period of reference.

Standard TDMs are produced for the following ranges of AIS ship types:

- Passenger AIS type codes 60 to 69,
- **Cargo** AIS type codes 70 to 79,



- Tanker AIS type codes 80 to 89,
- **Fishing** AIS type code 30,
- All other includes all ship types not listed above, and
- All Traffic includes all ships monitored.

2.1.2 Detailed TDMs

Detailed traffic density maps present the traffic density in the Specific Areas of Interest (SAIs). The reference grids used to build Detailed TDMs have a definition of 200x200 meters. The grid cells are aligned to the cells used for the Standard TDMs.

2.1.3 Vector TDMs

Vector TDMs present routes (polylines) of ships within Specific Areas of Interest (SAIs). A Vector TDM is a set of daily ships routes segments contained in a certain time period, i.e. the route of the ship from its entry in the area to its exit is cut into daily segments covering the ship's positions during 24h periods. The ship route is a polyline connecting consecutive ship's positions¹.

2.1.4 Comparative TDMs

Comparative TDMs present the difference between two selected Standard TDMs or Detailed TDMs of the same type, time period category, area but different time periods.

Comparative TDMs are constructed "on-the-fly", on the user's request in SEG. They present the differences in values per cell using colour ranges.

2.2 Methodology used to create TDMs

The sections below provide an overview of the methodologies for calculating TDMs. More details are provided in the TDM methodology document which is available on EMSA's website.

2.2.1 Standard TDMs

The following steps are used to calculate a Standard TDM:

- a. Divide the selected area in cells,
- b. Aggregate ships positions per grid cell,
- c. Connect ship positions to create polylines, sort the polylines per ships type ranges,
- d. Count grid cell crossings,
- e. Apply a density classification colouring, and
- f. Make the maps available to SEG.

The result is a TDM per ship type range, per area and per time period. The steps are presented in Figure 3.

¹ Reported AIS positions





Figure 3: Steps for creating a TDM

2.2.2 Detailed TDMs

The general steps for creating a Detailed TDM are the same as for Standard TDMs, but reference grids have a definition of 200x200 meters. Detailed maps are created using the same ships positions data as for Standard TDMs. Filtering and down sampling configurations are identical as well.

Detailed maps are constructed for all time categories (month, spring, summer, autumn, winter, year) and ship types ranges (i.e. Cargo, Tanker, Fishing, Passenger, All Other and All Traffic), but only for the predefined specific areas of interest (SAIs).

2.2.3 Vector TDMs

Calculation of Vector TDMs follows the general TDMS methodology with some exceptions. Ship routes calculations follow the same algorithms as for Standard and Detailed TDMs. The same filtering, down sampling and routes reconstruction configurations are applied as well. However, the reconstructed routes undergo an additional processing to calculate ship routes' metadata (speed, duration, length).

Vector TDMs are calculated for specific areas (SAIs) and are provided per month only. Vector TDMs are not generated per individual ship type range, the only proposed ship type range is "All traffic".

Routes length

The system calculates the total length of all ship routes in the area. The routes' lengths are measured from the ship's entrance in the area (or the first position) to its exit from the area (or the last position). The route's length is calculated for each route segment. The statistics are calculated by aggregating the data.

Average ships speed

The system calculates the average ship speed of all routes. The average speed is also calculated for each route's segment. The statistics are calculated by aggregating the data.

Ships routes duration

The system calculates a total duration of all ship routes, measured from ship's entrance in the area (or the first timestamp), until the ship's exit from the area (or the last timestamp). The duration of each route segment is also calculated. The statistics are calculated by aggregating the data.

2.2.4 Comparative TDMs

The TDM service requires, as a parameter to create Comparative TDM, the identification of two Standard or Detailed TDMs. Only existing maps (pre-calculated and available) can be selected. The traffic density values in the newer map are compared against the values in older map. The newer (most recent) map is always used as a reference to define differences. Comparative TDMs are calculated on request and are not stored.



Figure 4: Comparative TDMs calculation

2.3 Users

Access to TDMs is restricted to end-users having access to SEG and to operation "IVTMIS", who have the following user profiles: SSN NCA, Maritime Authority, or Port.

Users with profile Port can only view Standard TDMs and Standard Comparative TDMs (no download is possible).

2.4 Use of TDM data products

The TDMs data files are produced by EMSA to support the VTMIS purposes and objectives. The users shall refer to EMSA as the source of information when using the TDM data or promoting the TDM based services, or generating related publications, whatever the purpose.



3. How to display TDMs in SEG

TDMs are available to users through the EMSA SEG application. To access the maps, users should complete the following steps:

3.1 Access the Maritime Applications Portal

Use your "Username" and "Password" to log in EMSA's Maritime Applications Portal.



3.2 Open the SEG application

Click on the SEG application icon.



3.3 Activate the Traffic Density Maps layer

In the layers panel, select the layer "Traffic Density Maps"



The base layer (background map) can be changed by using the option "Base layers".

•••• tr	Q		-	
8	V	LAYERS 💿 💿	×	BASE LAYERS
Ð		Base Layers	>	> CMAP Base
		PLACEMARKS	7	CMAP Standard
^Ω Λ	\bigcirc	VESSELS	>	> Bing Satellite
1	\bigcirc	PORTS AND OFFSHORE	>	> OpenStreetMap
		EO INFO	>	> Bing
		METOCEAN	>	> Global Bathymetry
	\bigcirc	ORGANISATIONS	>	> EU Bathymetry
		AREAS	>	>
		ALERTS	>	>
	•	TRAFFIC DENSITY MAPS		
		AOI	>	>
	-		-	

3.4 Open the TDM app

Click on the "Apps" icon to open the "Apps" panel.



Click on the "Add Traffic Density Map" icon.



A new panel "*Traffic Density Maps*" will open, allowing to request the TDM to be displayed.

Type of map TDM Type	
Area Area	~
Ship Type range Ship Type	
Period TDM Time	
RESET	SUBMIT

The panel can be moved by grabbing and dropping it to a new location on the screen.

3.5 Select the map

3.5.1 Select Standard TDM

To request a Standard TDM, <u>all the criteria must be selected</u> (*Type of map*; *Area*, *Ship Type range* and *Period*) using the drop-down menus.

• **Type of map**: Click on the "*TDM Type*" bar and then on a map type (e.g. Standard) in the drop-down menu.



Area: Click on the "Area" bar and then on the selected area (e.g. Baltic Sea) in the drop-down menu.

Traffic Density Maps	×		
Type of map TDM Type	~		
Area Area	×)	All Europ	e
Ship Type range	~	Atlantic	
Period TDM Time		Baltic Sei Black Sea	3
		Mediterra	anean Sea
RESET SUBMIT		North Se	a / Atlantic

• Ship type range: Click on the "Ship Type" bar and then on a ship type range (e.g. Tanker) in the dropdown menu.

Traffic Density N	aps	×
Type of map	ТДМ Туре	~
Area	Area	<u>``</u>
Ship Type range	Ship Type	All Traffic
Period	TDM Time	Cargo Tanker
		Fishing
RE	SET SUBMI	Passenger
		All other

• **Period**: Click on the "*TDM Time*" bar, then click on the time period (e.g. "Monthly") in the drop-down menu.



After selecting the period (e.g. monthly TDM), a new selection bar "*Date range-1*" will be enabled, allowing to specify the month, season or year of the map (depending on the selected period).

Traffic Density N	laps	×
Type of map	Standard	×)
Area	Baltic Sea	~
Ship Tyte Linge	Tanker	× .
Period	monthly	× .
Date range 1 Date range 1		×)
RE	SET	SUBMIT

Click on the "*Date range -1*" bar and then select the month (or e.g. season) from the drop-down menu. The drop-down menu shows all maps available for this category.



Note: All maps are sorted by the year and month (e.g. "2019-08(August)"). Dates ranges of seasonal maps are named by the first month in the season, e.g. the name of the map for spring 2019 is "**2019-03(March)**". Date ranges of yearly maps are named by the first month in the year, e.g. "**2020-01(January)**".



3.5.2 Select Detailed TDM

To request a Detailed TDM, <u>all the required criteria must be selected</u> (*Type of map*; *Area*, *Specific Area of Interest*; *Ship Type range* and *Period*) using the drop-down menus.

Note: selection bar "Specific Area of Interest" will be activated only if the selected type of map is "Detailed".

• **Type of map**: Click on the "*TDM Type*" bar and then on a map type (e.g. Detailed) in the drop-down menu.

	×	laps	Traffic Density N
Standard	~]	ТДМ Туре	Type of map
Vector	~	Area	Area
Comparative Standard		Ship 7 e	Ship Type range
Comparative Detailed		TDM Time	Period
	SUBMIT	SET	RE

After selecting the type of map "Detailed", a new selection bar "*Specific Area of Interest*" will be enabled, allowing to specify the map (depending on the selected area).

Traffic Density N	laps	×
Type of map	Detailed	×]
Area	Area	×)
Specific Area of Interest	Specific area	× (
Ship Type range	Ship Туре	×)
Period	n thly	
RE	SET SUBI	міт

• Area: Click on the "Area" bar and then on an area (e.g., Atlantic) in the drop-down menu.

Traffic Density N	laps		×	
Type of map	Detailed		~)	
Area	Area		~	Atlantic
Specific Area of Interest	Specific area	1		Baltic Sea Black Sea
Ship Type range	Ship Type		11	Mediterranean Sea
Period	monthly	U /		North Sea / Atlantic
		- 4		
RE	SET	SUBMIT		

Note: for Detailed TDMs, the drop-down menu will not include the area "All Europe"

• **Specific Area of Interest**: Click on the "**Specific Area**" bar and then select the SAI (e.g., NSP – La Palma) from the drop-down menu. The drop-down menu shows all SAIs available for this type of map and the selected area.

Hame Benoty R	mp2	
Type of map	Detailed	•
Area	Atlantic)
Specific Area of Interest	Specific area	Filter here
Ship Type range	Ship Type	Atlantic - NSP - El Hierro
Period	monthly	Atlantic - NSP - Fuerteventura and Lanzarot
		Atlantic - NSP - Gran Canarias
RE	SET	SUBMIT
		Atlantic - NSP - Raz de Sein
		Atlantic - NSP - Tenerife and La Gomera
2.19		Atlantic - TSS - Ushant
		Atlantic - VTS - Azores S. Maria
	LEAD AND THE	Atlantic - VTS - Azores S. Miguel
		Atlantic - VTS - East of Central Amount
		HUBILLY - YIJ - LODE OF CERTIES PLOTED
	1	Atlantic - VTS - Madeira Island
	1	Atlantic - VTS - Madeira Island Atlantic - VTS - North of Madeira

• Ship type range: Click on the "Ship Type" bar and then on a ship type range (e.g., Tanker) in the dropdown menu.



• **Period**: Click on the "*TDM Time*" bar, then click on the time period (e.g., "Monthly") in the drop-down menu.

Traffic Density M	Aaps 🛛	
Type of map	Detailed ~	
Area	Mediterranean Sea 🗸 🗸	
Specific Area of Interest	Mediterranean Sea - NSP - Ibiza 🛛 🗸 🗸	
Ship Type range	All Traffic V	
Period	TDM Time 🗸 🗸	Yearly
R	ISET SUBMIT	Spring Summ
		Autun Winte
		month

After selecting the period, a new selection bar "Date range-1" will be enabled, allowing to specify the month, season, or year of the map (depending on the selected period) (e.g., "2019-08(August)").



Traffic Density M	aps		×
Type of map	Detailed		~)
Area	Atlantic		~
Specific Area of Interest	Atlantic - NSP - La Palma		~)
Ship Type range	Tanker		~)
Period	monthly		
Date range 1	15		
Date range 1			~)
RE	SET	SUBMIT	

• **Date range:** Click on the "*Date range*" bar and then select the month (or e.g., season or year) from the drop-down menu. The drop-down menu shows all maps available for this category.

Traffic Density	Maps	\sim
Type of map	Detailed	~
Area	Atlantic	▼
Specific Area of Interest	Atlantic - NSP - La Palma	
Ship Type range	Tanker	
Period	nonthly	
Date range 1	M	
Date range	1	- Filter here
		2022-02 (February)
I	RESET SUBMIT	2022-01 (January)
0000		2021-12 (December)
11/20		2021-11 (November)
11		2021-10 (October)
1	1	2021-09 (September)
		2021-08 (August)
1011		2021-07 ()uly)
1 100		2021-06 (june)
111		2021-05 (May)
121	11 201 111	2021-04 (April)
2		2021-03 (March)
	A POST MARINE	2021-02 (February)

Note: Date ranges of seasonal maps are named by the first month in the season, e.g., the name of map for spring 2019 is "2019-03(March)". Date ranges of yearly maps are named by the first month in the year, e.g., "2020-01(January)".

Traffic Density M	aps		×
Type of map	Detailed		~ ~)
Area	Atlantic		~)
Specific Area of Interest	Atlantic - NSP - La Palma		~
Ship Type range	Tanker		~ ~)
Period	monthly		
Date range 1	V		
2021-12 (Dece	mber)		~
RES	GET DET	SUBMIT	

3.5.3 Select Vector TDM

To request a Vector TDM, <u>all the required criteria must be selected</u> (i.e.**Type of map**; **Area**, **Specific Area of Interest** and **Period**) using the drop-down menus.

Note: selection bar "**Specific Area of Interest**" will be activated only if the selected type of map is "Vector". **Note**: for Vector TDMs, only the period "Monthly" and the ship types range "All traffic" are available by default.

• **Type of map**: Click on the "*TDM Type*" bar and then on a map type (e.g. Vector) in the drop-down menu.

Type of map	ТОМ Туре	 Standard
Area	Area	Vector
Ship Type range	Туре	Detailed Comparative Stan
Period	TDM Time	Comparative Deta

After selecting the type of map "Vector", a new selection bar "*Specific Area of Interest*" will be enabled, allowing to specify the map (depending on the selected area).

Traffic Density N	laps	\times
Type of map	Vector	×)
Area	Area	×)
Specific Area of Interest	Specific area	~
Ship Type range	All traffic	
Period	monthly	
RE	SET SUBMIT	

• Area: Click on the "Area" bar and then on an area (e.g. Atlantic) in the drop-down menu.

Traffic Density N	laps	×
Type of map	Vector	 Image: A set of the set of the
Area	Area	✓ Atlantic
Specific Area of Interest	Specific area	Baltic Sea Black Sea
Ship Type range	All traffic	Mediterranean Sea
Period	monthly	North Sea / Atlantic
RE	SET	UBMIT

Note: for Vector TDMs the drop-down menu will not include the area "All Europe"



• **Specific Area of Interest**: Click on the "**Specific Area**" bar and then select the SAI (e.g. TSS Kaliakra Cape) from the drop-down menu. The drop-down menu shows all SAIs available for this type of map and the selected area.

Area Black Sea Specific Area of Interest Specific area Ship Type range All traffic Period monthly	Black Sea	Type of map	Vector	~	1999
Specific Area of Interest Specific area Black Sea - 585 - Approaches t Ship Type range All traffic Black Sea - 155 - Approaches t Period monthly Black Sea - 155 - Approaches t	n of Specific area Black Sea - 585 - Approaches to Sulina Black Sea - 1585 - Approaches to Sulina Black Sea - 1555 - Approaches to Durgas Black Sea - 1555 - Approaches to Constant Monthly Black Sea - 155 - Approaches to Midia Black Sea - 155 - Approaches to Widia Black Sea - 155 - Approaches to Widia	Area	Black Sea	~	11819
Ship Type range All traffic Black Sea - TSS - Approaches t Black Sea - TSS - Approaches t Black Sea - TSS - Approaches t Black Sea - TSS - Approaches t	nge All traffic Black Sea - TSS - Approaches to Burgas Black Sea - TSS - Approaches to Burgas Black Sea - TSS - Approaches to Constant Black Sea - TSS - Approaches to Midia Black Sea - TSS - Approaches to Midia Black Sea - TSS - Approaches to Varna	Specific Area of Interest	Specific area	×)	Black Sea - SRS - Approaches to Sulina
Period monthly Black Sea - TSS - Approaches t	monthly Black.Sea - TSS - Approaches to Midia Black.Sea - TSS - Approaches to Midia	Ship Type range	All traffic		Black Sea - TSS - Approaches to Burgas
	Black Sea - TSS - Approaches to Varna	Period	monthly	57	Black Sea - TSS - Approaches to Constant
Black Sea - TSS - Approaches t					Black Sea - TSS - Approaches to Varna

- **Ship type range**: for Vector TDMs, the only ship type range "All traffic" is available by default. This value is pre-configured and cannot be changed.
- **Period:** for Vector TDMs, the only period "Monthly" is available by default. This value is preconfigured and cannot be changed.



After selecting the "**Specific Area of Interest**", a new selection bar "**Date range-1**" will be enabled, allowing to specify the month of the map (e.g. "**2019-08**(August)").

Traffic Density M	aps	\sim	Traffic Density M	laps	×
Type of map	Vector	\sim	Type of map	Vector	~
Area	Black Sea	~	Area	Black Sea	~
Specific Area of	Specific area	~	Specific Area of Interest	Black Sea - TSS - Kaliakra Cape	~
Ship Type range	All traffic		Ship Type range	All traffic	
Period	monthly		Period	monthly	
			Date range 1 Date range 1		~
RE	SET	SUBMIT	RE	SET SUBMIT	

Click on the "*Date range*" bar and then select the month (e.g. 2021-12(December) from the drop-down menu. The drop-down menu shows all maps available for this category.

Type of map	Vector	~	
Area	Black Sea	~	
Specific Area of Interest	Black Sea - TSS - Kaliakra Cap	2 ~	
Ship Type range	All traffic	1	
Period	monthly		
Date range 1			
Date range 1		~	Filter here
			2022-02 (February)
RE	ISET	SUBMIT	2022-01 (January)
		27	2021-12 (December)
			2021-11 (November)
			2021-10 (October)
			2021-09 (September)

3.5.4 Select Comparative Standard TDM

To request a Comparative Standard TDM, all the required criteria must be selected (i.e. *Type of map; Area, Ship Type range* and *Period*) using the drop-down menus.

• **Type of map**: Click on the "*TDM Type*" bar and then on a map type (Comparative Standard) in the dropdown menu.

		×	
		~	Standard
4		~	Vector
		~	Comparative Standard
		×	Comparative Detailed
	SUBMIT		
	4	SUBMIT	SUBMIT

• Area: Click on the "Area" bar and then on the selected area (e.g. Baltic Sea) in the drop-down menu.

Traffic Density N	laps		2
Type of map	Comparative Standard		~
Area	Area		✓ All Europe
Ship Type range	Ship Type	_	Atlantic Baltic Sea
Period	TDM Time		Black Sea
			Mediterranean Sea
RE	SET	SUBMIT	North Sea / Atlantic



• **Ship type range**: Click on the "*Ship Type*" bar and then on a ship type range (e.g. Tanker) in the dropdown menu.

Traffic Density Maps ×				
Type of map	Comparative Standard		~]	
Area	Baltic Sea		~]	
Ship Type range	Ship Type		~]	All Traffic
Period	TDM T' AF		~	Cargo
	4			Fishing
RE	SET	SUBMIT		Passenge
				All other

• **Period**: Click on the "*TDM Time*" bar, then click on the time period (e.g. "Yearly") in the drop-down menu.

Traffic Density Maps			
Type of map	Comparative Standard	~	
Area	Baltic Sea	~) ~	
Ship Type range	Tanker	~	
Period	TDM Time	~	year
	- 5.		sprir
RE	ISET	SUBMIT	sumi
			autu
	18		wint
	18		mon

After selecting the period (e.g. yearly), two new selection bars "*Date range-1*" and "*Date range-2*" will be enabled, allowing to specify the time criteria (month, season or year - depending on the selected period) of two corresponding Standard TDMs to be compared ((e.g. "2019-01(January)" and "2020-01(January)")².

Traffic Density M	×	
Type of map	Comparative Standard	~)
Area	Baltic Sea	<pre>~]</pre>
Ship Type range	Tanker	<pre>~)</pre>
Period	yearly	· · · · · · · · · · · · · · · · · · ·
Date range 1	M	
Date range 1		~
Date range 2		
Date range 2	X	~
RE		т

Note: Date ranges of seasonal maps are named by the first month in the season, e.g. the name of the map for spring 2019 is "2019-03(March)". Date ranges of yearly maps are named by the first month in the year, e.g. "2020-01(January)".

² For Date range-1 select the newest of two maps to be compared

• Date range-1: Click on the "Date range-1" bar and then select from the drop-down menu the month, season or year (depending on the period selected) of the first map. The drop-down menu shows all maps available for this category.

Traffic Density Maps		×	
Type of map	Comparative Standard		
Area	Baltic Sea	×)	
Ship Type range	Tanker	× ×	1.1
Period	yearly	× v	1.1
Date range 1			
Date range 1		~	2021-01 (January)
Date range 2		1	2020-01 (January)
Date range 2			2019-01 (January)
RE	SET	SUBMIT	

• Date range-2: Click on the "Date range-2" bar and then select from the drop-down menu the month, season, or year (depending on the period selected) of the second map. The drop-down menu shows all maps available for this category.

Traffic Density Maps			
Type of map	Comparative Standard	~]	
Area	Baltic Sea	× .	
Ship Type range	Tanker	×)	
Period	yearly	×	
Date range 1			
2021-01 (Janu	ary)	<u> </u>	
Date range 2			
Date range 2		· · ·	2021-01 (January)
			2020-01 (January)
RES	ET	SUBMII	2019-01 (January)

Note: the selected both maps should have different date ranges.

Traffic Density Maps			×
Type of map	Comparative Standard		~ ~)
Area	Baltic Sea		~
Ship Type range	Tanker		~)
Period	yearly		~)
Date range 1			
2021-01 (Janu	iary)		~)
Date range 2			
2020-01 (Janu	Jary)		~]
RE	SET	SUBMIT	

3.5.5 Select Comparative Detailed TDM

To request a Comparative Detailed TDM, all the required criteria must be selected (*Type of map*; *Area*, *Specific Area of Interest*, *Ship Type range* and *Period*) using the drop-down menus.

• **Type of map**: Click on the "*TDM Type*" bar and then on a map type (Comparative Detailed) in the dropdown menu.

Traffic Density N	laps			×	
Type of map	TDM Type			~ ~]	Standard
Area	Area	Λ		~	Vector
Ship Type range	Ship Type	11		~	Comparative Standard
Period	TDM Time				Comparative Detailed
RE	SET		SUBMIT		

After selecting the type of map "Comparative Detailed TDM", a new selection bar "*Specific Area of Interest*" will be enabled, allowing to specify the map (depending on the selected area).

Note: selection bar "Specific Area of Interest" will be activated only after selecting the type of map "Comparative Detailed TDM".

Traffic Density Maps		
Type of map	Comparative Detailed	×)
Area	Area	×)
Specific Area of Interest	Specific area	~
Ship Type range	Ship Type	 V
Period	monthly	
RE	SET SUBA	AIT

• Area: Click on the "Area" bar and then on an area (e.g. Black Sea) in the drop-down menu.

Traffic Density Maps			
Type of map	Comparative Detailed	~	
Area	Area	~ A	tlantic
Specific Area of Interest	Specific area	· · · ·	altic Sea lack Sea
Ship Type range	Ship Type		lediterranean Sea
Period	monthly		orth Sea / Atlantic
RE	SET	SUBMIT	

Note: for Comparative Detailed TDMs the drop-down menu will not include the area "All Europe"

• **Specific Area of Interest**: Click on the "*Specific Area*" bar and then select the SAI (e.g. TSS Approaches to Sulina) from the drop-down menu. The drop-down menu shows all SAIs available for this type of map and the selected area.

Traffic Density N	laps	×	
Type of map	Comparative Detailed	~	
Area	Black Sea	~	
Specific Area of Interest	Specific area	~	Black Sea - SRS - Approaches to Sulina
Ship Type range	Ship Type	5	Hack Sea - TSS - Approaches to Constant Black Sea - TSS - Approaches to Midia
Period	monthly		Contraction and Annual
RE	SET	SUBMIT	

 Ship type range: Click on the "Ship Type" bar and then on a ship type range (e.g. Cargo) in the dropdown menu.

Traffic Density Maps ×				
Type of map	Comparative Det	ailed	~)	
Area	Black Sea		~	
Specific Area of Interest	Black Sea - SRS	- Approaches to Sulina	~)	
Ship Type range	Ship Type		~	All Traffic
Period	monthly	8		Cargo
				Tanker
				Fishing
RESEI				Passenge
and the second	Stat Martin	and set of the		All other

• **Period**: Click on the "*TDM Time*" bar, then click on the time period (e.g. "Monthly") in the drop-down menu.

After selecting the period, two new selection bars "*Date range-1*" and "*Date range-2*" will be enabled, allowing to specify the time criteria of two corresponding Detailed TDMs to be compared (monthly, seasonal or yearly - depending on the selected period) ((e.g. "2019-02(February)" and "2020-03(March)").

Note: Date ranges of seasonal maps are named by the first month in the season, e.g. the name of the map for spring 2019 is "2019-03(March)". Date ranges of yearly maps are named by the first month in the year, e.g. "2020-01(January)".

Traffic Density Maps		
Type of map	Comparative Detailed	~ ~)
Area	Black Sea	~ ~)
Specific Area of Interest	Black Sea - SRS - Approaches to Sulina	~)
Ship Type rate	Cargo	~ ~)
Period	monthly	
Date range 1		
Date range 1		~]
Date range 2		
Date range 2	T	×)
RES		



• **Date range-1:** Click on the "*Date range-1*" bar and then select the month, seasonal or year (depending on the period selected) of the first map from the drop-down menu. The drop-down menu shows all maps available for this category.

Traffic Density M	aps	×
Type of map	Comparative Detailed	*
Area	Black Sea	 Image: A set of the set of the
Specific Area of Interest	Black Sea - SRS - Approaches to Sulina	 Image: A second s
Ship Type range	Cargo	 Inskitchelijste
Period	monthly	
Date range 1	<u>N</u>	
Date range 1		Filter here
Date range 2		2022-02 (February)
		e2-01 (January)
RES	SUBMIT	2021-12 (December)
		2021-11 (November)

• Date range-2: Click on the "Date range-2" bar and then select the month, season, or year (depending on the period selected) of the second map from the drop-down menu. The drop-down menu shows all maps available for this category.

Traffic Density N	laps	$\overline{\mathbf{x}}$	
Type of map	Comparative Detailed	~	
Area	Black Sea	~	
Specific Area of Interest	Black Sea - SRS - Approaches to Sulina	~	
Ship Type range	Cargo	~	
Period	monthly		
Date range 1	<i>h</i>		
2021-12 (Dec	ember)	\[
Date range 2			
Date range 2		Filt	er here
		2022-	02 (February)
RESET SUBMIT		2022-	01 (January)
		2021-1	2 (December)
		2021-1	1 (November)
		2021-1	0 (October)

Note: the selected both maps should have different date ranges.

Traffic Density Maps					
Type of map	Comparative Detailed	~)			
Area	Black Sea	~ ~)			
Specific Area of Interest	Black Sea - SRS - Approaches to Sulina	~]			
Ship Type range	Cargo	~			
Period	monthly				
Date range 1 2021-12 (Dece	mber)	~			
Date range 2 2022-02 (February)					
RE	SET SUBMIT				

3.6 Request the selected map

Once all criteria are selected, submit your request by clicking on the "*Submit*" button. To reset your selection, use the "*Reset*" button.

Traffic Density Maps			Traffic Density N	×			
Type of map	Vector		~		Type of map	Detailed	×)
Area	Mediterranean Sea		~		Area	North Sea / Atlantic	~
Specific Area of Interest	Mediterranean Sea -	NSP - Ibiza	~		Specific Area of Interest	North Sea/ Atlantic - SEZ - BE Zone	D v
Ship Type range	All traffic	1			Ship Type range	Tanker	×
Period	monthly				Period	monthly	
Date range 1 2021-11 (Nove	ember)		~		Date range 1 2021-12 (Dece	ember)	-
RE	SET 🛛	SUBMIT			RE	SET SUI	вміт
		Traffic Density N	Aaps			8	
		Type of map	Standard			× 1	
		Area	Baltic Sea			× 1	
		Ship Type range	Fishing		1	¥.	
		Period	yearly		- 11 -	~	
		Date range 1 2020-01 (Jan	uary)		-4	~]	
		RE	SET		SUBME		
Traffic Density M	aps		\sim	ſ	Traffic Density Ma	ips	×
Type of map	Comparative Detailed		~]	1	Type of map	Comparative Standard	~
Area	Black Sea		~		Area	Black Sea	~
Specific Area of Interest	Black Sea - SRS - Appr	oaches to Sulina	~		Ship Type range	Cargo	~
Ship Type range	Cargo		~		Period	spring	~
Period	monthly				Date range 1	7	
Date range 1	umber)	1	~		2021-03 (Marc	h)	~
Date range 2					Date range 2	b)	
2022-02 (Febr	ruary)		~		2019-03 (Marc	"	
RES	SET	SUBMIT			RES	ET SUB	міт

Your requested map will be displayed on the screen. Use SEG functionalities to zoom it to the required level. The TDM will also be added to the list in the bottom-right corner of the page.

^{//} Traffic De	nsity Maps 🔕		I			NICCUT OC
Filter	applied in all co	olumns Q 🕞	۵ 🚺			
	A O	SHIP TYPE RANGE 📀	PERIOD 📀	DATES O	MAP NAME 📀	DOWNLOAD 📀
ВАІ	TIC SEA	ALL TRAFFIC	YEARLY	2021-01 (January)	STANDARD	Download
МЕ	DITERRANEAN SEA	FISHING	YEARLY	2020-01 (January)	STANDARD	<u>Download</u>
МЕ	DITERRANEAN SEA	TANKER	MONTHLY	2021-11 (November)	DETAILED	<u>Download</u>

TDMs can be removed from the display by using the "trash" icon in the top-right corner of the page. Click on the trash icon and then on the corresponding TDM in the list.



3.7 View information and legend of a TDM

The "Traffic Density Map Info" panel is opened automatically when the TDM is requested and when clicking on TDM area on the screen. The structure and content of the information panel depends on the type of map.

affic Density Map Info		Traffic Density Map Info		
Traffic De	nsity Map	Traffic De	ensity Map	
Creation Date	01.09.2020	Creation Date	11.02.2022	
TDM type	Standard	TDM type	Vector	
Area	Baltic Sea	Area	Mediterranean S	
Period	Summer	Specific Area of Interest	Mediterranean S Nsp - Ibiza	
Date range	2020-06 (June)	Period	Monthly	
Start date	01.06.2020	Date range	2022-01 (January	
End date	31.08.2020	Start date	01.01.2022	
Ship type range	Tanker	End date	31.01.2022	
Number of Ships Monitored	961	Ship type range	All Traffic	
Colour	legend	Number of unique ships in SAI	418	
1 2-15		Number of ship routes segments in SAI	2229	
15-30 30-60		Ships speed (averange) in SAI	7.61	
60-300		Total length or ships routes in SAI	27446.9	
300-		Total time of ship routes in SAI	5982:28:53	

The panel can be moved by grabbing and dropping it to a new location on the screen.

3.8 View traffic density values per grid cell

This functionality is available for Standard, Detailed and Comparative TDMs. Click at any (selected) grid cell in a TDM area. The "Selected Cell" section in the "Traffic Density Maps Info" panel will be opened and the value of the selected grid cell (number of crossings) will be presented.



For Comparative maps, the information panel will present the values of the compared cell per each map and the difference.

3.9 View ships routes information

This functionality is available for Vector TDMs. Double click at any (selected) ship route (polyline) in the Vector TDM. The selected ship route's segment will be visualised with a different colour and the "*Selected route segment*" section in the "*Traffic Density Map Info*" panel will be opened, providing details of the selected ship route's segment (date, speed, length, duration etc.).



3.10 Download TDMs

This functionality is available only for Standard and Detailed TDMs. Once a TDM is requested, a link to download the map will be activated in the TTT panel in the bottom-right corner of the table.

Click on the link to request the selected map (zipped files): a georeferenced image file, a grid data file, and a metadata file. Use system's functionalities to download the map (files).



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