



PM2.5 emissions in European shipping areas in 2019, Mar. 2021

This metadata refers to the map showing the PM2.5 emissions from ships in European shipping areas during the year 2019. The numerical values reported in the map are kilograms of PM2.5 per grid cell area.

PM2.5 from shipping forms during the various combustion processes on board. In ports an increase in PM10 (PM with a diameter of 10 µm or less) and PM2.5 concentrations can also be observed due to loading, unloading and bunkering operations. There is a direct relationship between the SO_x and NO_x emitted by ships and the resulting PM. A fraction of SO₂ emitted from the engines reconverts into SO₃ which almost immediately forms sulphates (PM2.5). In the atmosphere, SO₂ is also transformed into particulate sulphate (PM2.5).

The dataset has been prepared in the context of developing the first European Maritime Transport Environmental Report (EMSA-EEA report, 2021: <https://www.eea.europa.eu/publications/maritime-transport>).

Simple

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Point of contact	Organisation name	Individual name	Electronic mail address	Website	Role
	European Environment Agency		sdi@eea.europa.eu	http://www.eea.europa.eu	Point of contact

Point of contact

No information provided.

Point of contact

No information provided.

Maintenance and update frequency	Unknown				
GEMET - INSPIRE themes, version 1.0	<ul style="list-style-type: none">Transport networksAtmospheric conditionsOceanographic geographical features				
Keywords					
Keywords					
GEMET	<ul style="list-style-type: none">marine pollutionenvironmentenvironmental qualitytransportationair pollutionseashipemission				

	<ul style="list-style-type: none"> • environmental impact of transport • ocean • marine environment • maritime transport
Continents, countries, sea regions of the world.	<ul style="list-style-type: none"> • Barents Sea • North Sea • Black Sea • Norwegian Sea • English Channel • Bay of Biscay • Adriatic Sea • Celtic Sea • Mediterranean Sea • Kattegat • Ionian Sea • Northeast Atlantic Ocean (40W) • Iceland Sea • Baltic Sea
Spatial scope	<ul style="list-style-type: none"> • European
EEA topics	<ul style="list-style-type: none"> • Air pollution • Seas and coasts • Transport and mobility • Pollution
Access constraints	Other restrictions
Other constraints	no limitations to public access
Use constraints	Other restrictions
Other constraints	EEA standard re-use policy: unless otherwise indicated, re-use of content on the EEA website for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged (http://www.eea.europa.eu/legal/copyright). Copyright holder: European Environment Agency (EEA).
Aggregate Datasetidentifier	22ad5ddf-967d-4ce7-9933-f7ac89e0b638
Association Type	Cross reference
Aggregate Datasetidentifier	5b83a3ca-2545-4b9e-a294-e709be063059
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Aggregate Datasetidentifier	f26cefae-6996-4c59-84de-2988fb1282da
Association Type	Cross reference
Spatial representation type	Grid

Distance	10 km
Language of dataset	English
Topic category	<ul style="list-style-type: none">• Environment• Oceans• Transportation

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Begin date	2019-01-01		
End date	2019-12-31		
Coordinate reference system identifier	EPSG:3035		
Distribution format	• netCDF ()		
OnLine resource	Protocol EEA:FOLDERPATH WWW:URL ESRI:REST OGC:WMS	Linkage https://sdi.eea.europa.eu/webdav/datastore/public/eea_r_3035_10_km_emter-PM25-2019_p_2019_v01_r00/GDB/ https://sdi.eea.europa.eu/data/96c10493-fc68-4656-af76-3ee8a754112f https://water.discomap.eea.europa.eu/arcgis/rest/services/Marine/Shipping_emissions_PM25_2019/MapServer https://water.discomap.eea.europa.eu/arcgis/services/Marine/Shipping_emissions_PM25_2019/MapServer/WMServer?request=GetCapabilities&service=WMS	Name Direct download
Hierarchy level	Dataset		

Conformance result

Title	Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services
Date (Publication)	2010-12-08
Explanation	See the referenced specification

Statement	<p>The dataset covers IHO sea regions inside the bounding box (excluding the Red Sea): Mediterranean Sea, Atlantic Ocean, North Sea, Baltic Sea, English Channel, Irish & British Seas, Black Sea, Norwegian Sea, Bay of Biscay, Arctic Ocean, Sea of Azov, Greenland Sea.</p> <p>This data was generated with STEAM ship emission model. The data reports the annual sums of ship emitted pollution to air/water /underwater noise. The variables included in this dataset are: Antifouling paint (CuO) release to water, Antifouling paint (CuPyr) release to water, Antifouling paint (DCOIT) release to water, Antifouling paint (Zineb) release to water, Antifouling paint (ZnO) release to water, Antifouling paint (ZnPyr) release to water, Ash emissions to air, Ballast water discharges to the sea, Bilge water discharge to the sea, Carbon monoxide (CO) emissions to air, Carbon dioxide (CO2) emissions to air, Elementary carbon (EC) emissions to air, Grey water (GW) discharge to water, Heavy Fuel Oil (HFO) used in ships, Liquid Natural Gas (LNG) used in ships, Marine Diesel Oil (MDO) used</p>
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in ships, Number of Automatic Identification System (AIS) messages received, Marine Gas Oil (MGO) used in ships, Foodwaste nitrogen released to water, Sewage nitrogen released to water, Underwater noise energy released to water (63 Hz 1/3 octave band), Underwater noise energy released to water (125 Hz 1/3 octave band), Underwater noise energy released to water (2000 Hz 1/3 octave band), Nitrogen oxide (NOx) emissions to air, Organic carbon (OC) emissions to air, Transport work (Payload) done by ships, Number of person days spent onboard ships, Particulate matter (PM, smaller than 2.5 micrometers) emissions to air, Particle number emissions to air, Closed loop scrubber effluent release to water, Open loop scrubber effluent release to water, Sewage discharge to water, Sulphate (SO4) emissions to air, Sulphur oxide (SOx) emissions to air, Stern tube oil release to sea, Non-methane volatile organic compound (VOC) emissions to air.

These data are based on global AIS data from Orbcomm Ltd, IHS Markit ship fleet description and FMI STEAM ship model. Technical references for the STEAM model:

Jalkanen, J.-P. P., Brink, A., Kalli, J., Pettersson, H., Kukkonen, J., Stipa, T., ... Stipa, T. (2009). A modelling system for the exhaust emissions of marine traffic and its application in the Baltic Sea area. *Atmos. Chem. Phys.*, 9(4), 9209–9223. <https://doi.org/10.5194/acp-9-9209-2009>

Jalkanen, J. P., Johansson, L., Kukkonen, J., Brink, A., Kalli, J., & Stipa, T. (2012). Extension of an assessment model of ship traffic exhaust emissions for particulate matter and carbon monoxide. *Atmospheric Chemistry and Physics*, 12(5), 2641–2659. <https://doi.org/10.5194/acp-12-2641-2012>

Johansson, L., Jalkanen, J.-P., Kalli, J., & Kukkonen, J. (2013). The evolution of shipping emissions and the costs of regulation changes in the northern EU area. *Atmospheric Chemistry and Physics*, 13(22), 11375–11389. <https://doi.org/10.5194/acp-13-11375-2013>

Johansson, L., Jalkanen, J.-P., & Kukkonen, J. (2017). Global assessment of shipping emissions in 2015 on a high spatial and temporal resolution. *Atmospheric Environment*, 167, 403–415. <https://doi.org/10.1016/j.atmosenv.2017.08.042>

Jalkanen, J.-P., Johansson, L., Liefvendahl, M., Bensow, R., Sigra, P., Östberg, M., ... Pajala, J. (2018). Modelling of ships as a source of underwater noise. *Ocean Science*, 14(6), 1373–1383. <https://doi.org/10.5194/os-14-1373-2018>

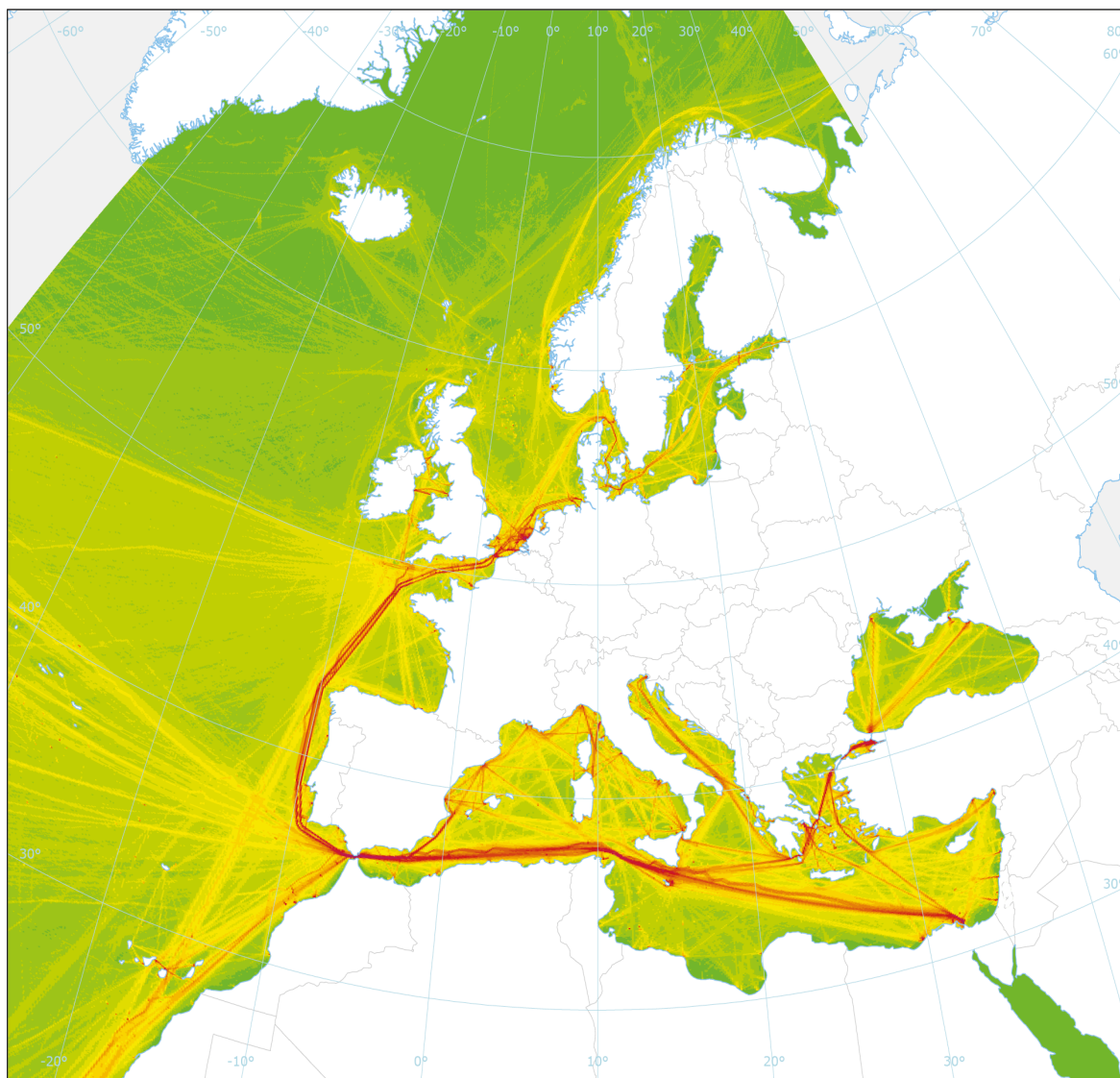
Jalkanen, J.-P., Johansson, L., Wilewska-Bien, M., Granhag, L., Ytreberg, E., Eriksson, K.M., Yngsell, D., Hassellöv, I.-M., Magnusson, K., Raudsepp, U., Maljutenko, I., Styhre, L., Winnes, H., Moldanova J. (2020). Modeling of discharges from Baltic Sea shipping. *Ocean Science Discussions*, <https://doi.org/10.5194/os-2020-99>, in review

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Metadata

File identifier	96c10493-fc68-4656-af76-3ee8a754112f XML		
Metadata language	English		
Character set	UTF8		
Hierarchy level	Dataset		
Date stamp	2023-01-03T08:38:32.857Z		
Metadata standard name	ISO 19115/19139		
Metadata standard version	1.0		
Metadata author	Organisation name	Individual name	Electronic mail address Website Role
	European Environment Agency		sdi@eea.europa.eu Point of contact

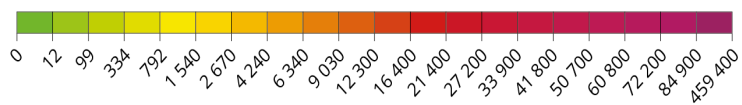
Overviews



Reference data: ©ESRI

2019 PM_{2.5} emissions from shipping in European Seas

Kg of PM_{2.5} per grid cell area



0 500 1 000 1 500 km

Provided by

