

ASTD DATA

INFORMATION DOCUMENT



PAME

Protection of the Arctic Marine Environment



ASTD DATA DOCUMENT

The *Cooperative Agreement among the Arctic States Regarding Arctic Ship Traffic Data Sharing* outlines access to the Arctic Ship Traffic Data (ASTD) Program and the use of ASTD data.

This document outlines and explains the ASTD data.

The document is intended for all ASTD users.

Questions can be sent to the PAME Secretariat (pame@pame.is)

ASTD Data Document Version History

[1.1](#): January 2019.

[1.2](#): April 2020.

[1.3](#): January 2021.

[1.4](#): March 2021.

[1.5](#): November 2022

[1.6](#): January 2023

[1.7](#): March 2023

[1.8](#): September 2023

[1.9](#): September 2024

[1.10](#): September 2025

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Protection of the Arctic Marine Environment

Geographic Scope

Data in ASTD is collected from satellites and base stations provided by USA, Norway and Iceland. Data is collected from a defined area, shown on the map to the right.

The area was chosen to include all EEZ of Arctic States, the Arctic Search and Rescue Areas, definitions of the Arctic by other Arctic Council Working Groups and other important Arctic defined areas.



ASTD Data

The ASTD Program data can be accessed by two means:

ASTD SYSTEM

- ✓ Easy access to data
- ✓ Quick analysis on pre-defined areas
- ✓ Easily add own areas for analysis
- ✓ Data is pre-calculated for each ship per month
- ✓ Simple to use

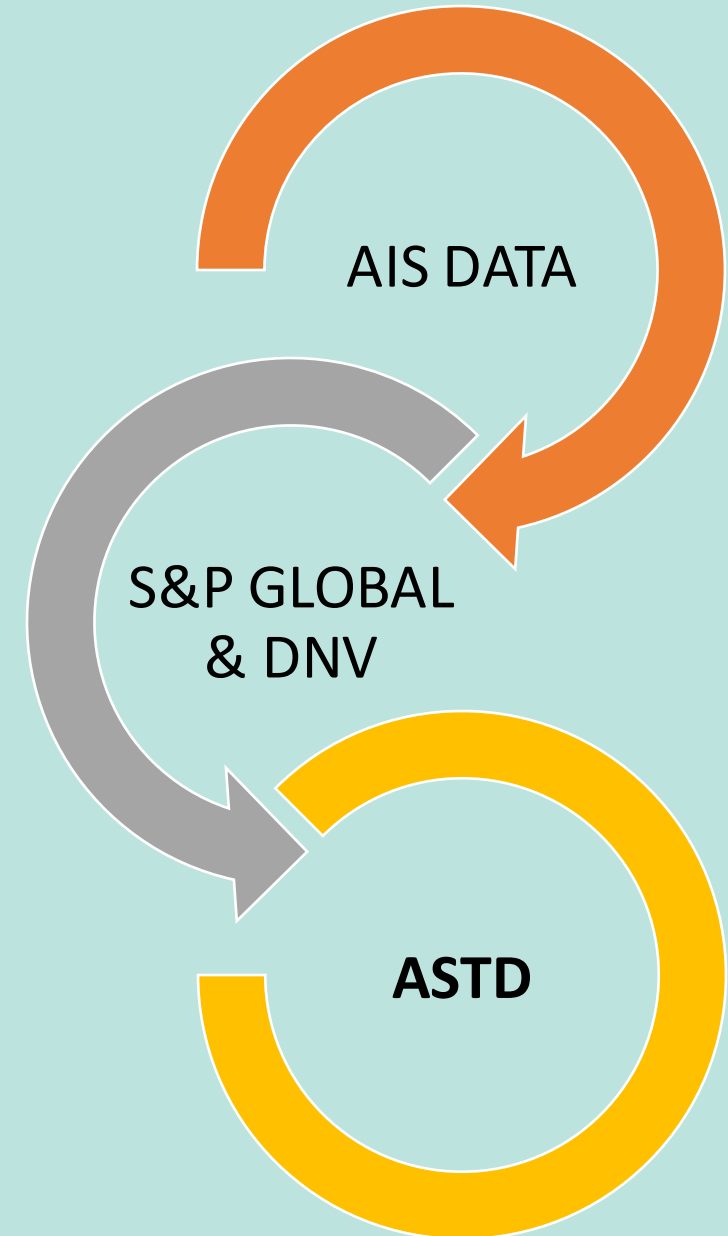
FTP SERVER

- ✓ Data in aggregated files for the whole ASTD area
- ✓ Data needs to be filtered, cleaned and processed from scratch
- ✓ Requires GIS expertise
- ✓ Slightly more details in data
- ✓ Intended for specific analysis
- ✓ ASTD users contact PAME Secretariat for access

ASTD DATA

The ASTD Program contains four types of information. These are:

1. Automatic Identification System (AIS data) received from ships operating in the Arctic. This data is collected by satellites and base stations. It is provided by USA, Norway and Iceland.
2. Ship characteristic information (e.g., type, size, flag, gross tonnage) from S&P Global (formerly IHS Markit, which had acquired Lloyds Register in 2009). Lloyds Register had collected information on ships since 1790. On behalf of IMO, S&P Global hosts a ship information database and is the sole issuer of IMO numbers. An IMO number is a unique number assigned to each ship. The IMO ship identification number scheme was introduced in 1987 as a measure to enhance ship safety and security. It established a mechanism for assigning a permanent number to each ship for identification purposes. That number remains unchanged through the ship's life. From this, information in the tables on page 7 and 9 is generated.
3. Information on the types of fuel ships are burning and calculated air emissions from such combustion are obtained from DNV. DNV makes these calculations based on IMO emission factors. DNV is the world's largest classification society and a recognized advisor to the maritime industry. See pages 19-20 & 22.
4. Sea ice data from the U.S. National Snow and Ice Data Center (NSIDC). ASTD contains monthly sea ice extent information obtained from the [NSIDC Sea Ice Index](#). The edge is smoothed for visual purposes using the following script:
`ST_ChaikinSmoothing(ST_SimplifyPreserveTopology(wkb_geometry,20000),2)`



ASTD DATA – ACCESS LEVELS

Arctic State approved government agencies and ministries, Arctic Council Permanent Participants and Arctic Council Working Groups get free access to the database. Others, such as Arctic Council Observers, pay a small fee for access to ASTD. Information on these specifics are available in the ASTD Application form – available on www.astd.is.

Access to ASTD data may be granted to eligible applicants at one of three access levels:
Level I, Level II and Level III

ACCESS LEVELS

- I Access to all available data
- II Access to all data in the System except that vessel identity data (MMSI, IMO ship identification number and ship name) is not included.
- III Access to the same data as under Level 2 except that ship type information is aggregated to 15 ship types instead of 56 ship types.

See tables on pages 7 & 9 what is included in the ASTD Data for each access level.

ASTD SYSTEM

The table shows data fields for each ship in the ASTD System and compares each access level. The fields are acquired by downloading data from the ASTD System.

See example of how the data looks when downloaded on page 8.

| DATA FIELD IN ASTD DATA | LEVEL 1 | LEVEL 2 | LEVEL 3 | EXPLANATION | PAGE |
|-------------------------|---------|---------|---------|---|-------|
| period | YES | YES | YES | Month and year chosen | - |
| area_type | YES | YES | YES | Type of area chosen (EEZ, LME etc.) | - |
| area_id | YES | YES | YES | Number if this area in the ASTD Database | - |
| Ship_id | NO | YES | YES | Ship identification number. | 11 |
| mmsi | YES | NO | NO | The identification number of the AIS-equipment on the vessel | 11 |
| imonumber | YES | NO | NO | IMO number of the ship | 11 |
| fishingvesselnumber | YES | NO | NO | Registration for fishing vessels | 11 |
| vesselname | YES | NO | NO | Name of ship | 11 |
| flagcode | YES | YES | YES | Flag Code for the ship | 12 |
| iceclass | YES | YES | YES | Ice Class for the ship | 13 |
| norwegianshiptypeid | YES | YES | YES | Type of ship id (ASTD) | 14-16 |
| norwegianshiptypename | YES | YES | YES | Type of ship (ASTD) | 14-16 |
| lloydsshiptypeid | YES | YES | NO | Type of ship id (Lloyds) | 14-16 |
| lloydsshiptypename | YES | YES | NO | Type of ship (Lloyds) | 14-16 |
| lloyds5_cat | YES | NO | NO | Type of ship id (Lloyds) | 14-16 |
| yearofbuild | YES | YES | YES | Year which a vessel was delivered to its original owner by a shipbuilder. | - |
| deadweight | YES | YES | NO | DWT of the ship, | 17 |
| draught | YES | YES | NO | Draught of the ship | 17 |
| lengthregistered | YES | YES | NO | Length of the ship | 17 |
| passengercapacity | YES | YES | NO | Maximum passenger capacity | 17 |
| grosstonnage | YES | YES | NO | GT of the ship | 17 |
| vesselsizedescription | YES | YES | YES | Vessel size category | 17 |
| fuelquality | YES | YES | YES | Type of fuel used | 18-19 |
| distance_nm | YES | YES | YES | Distance sailed in nautical miles | 20 |
| consumption | YES | YES | YES | Fuel consumption in metric tons | 18-19 |
| co2emission | YES | YES | YES | Co2 emission of the ship in metric tons | 21 |
| coemission | YES | YES | YES | CoE emission of the ship in metric tons | 21 |
| noxemission | YES | YES | YES | NOX emission of the ship in metric tons | 21 |
| so2emission | YES | YES | YES | So2 emission of the ship in metric tons | 21 |
| operationhour | YES | YES | YES | Hours operated | 22 |
| arcticshiptypeid | YES | YES | YES | ID for Arctic ship types | |
| arcticshiptype | YES | YES | YES | Ship types representative for the Arctic | |

ASTD SYSTEM: DATA DOWNLOAD FUNCTION – LEVEL 1

The example shows a part of ships in the Polar Code area in March 2023.

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | |
|---------|-----------|---------|-----------|----------|---------------------|--------------------|----------|-----------------------|---------------------|-----------------------|-----------------|-------------------|------------|-------------|------------|--------------|------------------|-------------------|--------------|-----------------------|----------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|-------------|
| period | area_type | area_id | mmsi | imnumber | fishingvesselnumber | vesselname | flagcode | iceclass | norwegianshiptypeid | norwegianshiptypename | lloydshiptypeid | lloydshiptypename | lloyds_cat | yearofbuild | deadweight | draught | lengthregistered | passengercapacity | grosstonnage | vesselsizedescription | fuelquality | distance_nm | consumption | co2emission | coemission | noxemission | so2emission | operationhour | |
| 2023-03 | polarcode | 1 | 273379890 | 8711306 | | ANDREY OSIPOV | RUS | FS Ice Class 1A Super | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1994 | 7346 | 6.880000114 | 0 | 0 | 7085 | 5000 - 9999 GT | 6 | 832.2724914 | 84.44921599 | 266.9381169 | 0.512577706 | 3.238342484 | 0.354686709 | 670.0091667 | |
| 2023-03 | polarcode | 1 | 273327220 | 8801632 | | BILIBINO | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1989 | 9590 | 8.541000366 | 106.4199982 | 0 | 6030 | 5000 - 9999 GT | 6 | 19.82699089 | 31.10848582 | 98.25613304 | 0.159108983 | 0.925907956 | 1.030655641 | 358.0722222 | |
| 2023-03 | polarcode | 1 | 273218890 | 9368340 | | MYS DEZHNEVA | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2008 | 17349 | 9.689999958 | 133.3600006 | 0 | 11835 | 10000 - 24999 | 6 | 1233.791958 | 86.69457186 | 274.6266268 | 0.637336143 | 6.438240461 | 0.364117201 | 141.1466667 | |
| 2023-03 | polarcode | 1 | 273382350 | 9014896 | | NIKIFOR BEGICHEV | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1991 | 12150 | 8.609999657 | 124.9899979 | 0 | 7949 | 5000 - 9999 GT | 6 | 1438.276755 | 88.77831722 | 280.9690431 | 0.604031488 | 4.076022911 | 0.372868936 | 495.7980556 | |
| 2023-03 | polarcode | 1 | 273359470 | 8912974 | | VALERI VASILIEV | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1991 | 13565 | 8.189999958 | 0 | 0 | 10374 | 10000 - 24999 | 6 | 1865.214298 | 109.5091533 | 346.754911 | 0.794330013 | 7.740822567 | 0.459938444 | 311.4461111 | |
| 2023-03 | polarcode | 1 | 273437510 | 9267297 | | BERING | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2003 | 10649 | 7.673999786 | 0 | 0 | 7737 | 5000 - 9999 GT | 6 | 576.4596274 | 25.65720632 | 81.295356 | 0.189863327 | 1.341799646 | 0.107760266 | 49.8888889 | |
| 2023-03 | polarcode | 1 | 219027854 | 9854636 | | SUANA ARCTICA | DIS | FS Ice Class 1A Super | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2020 | 2300 | 5.699999809 | 62.40000153 | 0 | 2613 | 1000 - 4999 GT | 6 | 920.9318861 | 44.8426176 | 141.7777201 | 0.331835369 | 1.988224877 | 0.188338994 | 742.9891667 | |
| 2023-03 | polarcode | 1 | 219027908 | 9854648 | | MALERAQ ARCTICA | DIS | FS Ice Class 1A Super | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2021 | 2300 | 5.699999809 | 62.40000153 | 0 | 2613 | 1000 - 4999 GT | 6 | 684.1032781 | 0 | | | | | 742.7922222 | |
| 2023-03 | polarcode | 1 | 273326150 | 8502119 | | ERMAK | RUS | FS Ice Class 1A Super | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1998 | 7049 | 7 | 122.5500031 | 0 | 6418 | 5000 - 9999 GT | 6 | 2482.842096 | 143.439136 | 454.1850391 | 1.004587354 | 6.914539305 | 0.602444371 | 558.7341667 | |
| 2023-03 | polarcode | 1 | 273218690 | 9368338 | | YAMAL BERKUT | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2008 | 17158 | 9.689999958 | 0 | 0 | 11825 | 10000 - 24999 | 6 | 1141.073989 | 156.8722361 | 496.0189948 | 1.038763579 | 8.593365312 | 0.658863393 | 724.49 | |
| 2023-03 | polarcode | 1 | 273216130 | 9366110 | | MYS ZHELANIYA | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2008 | 17300 | 9.710000038 | 133.3600006 | 0 | 11864 | 10000 - 24999 | 6 | 3346.52176 | 228.9072085 | 724.6821109 | 1.644950378 | 15.73654608 | 0.961410276 | 585.0605556 | |
| 2023-03 | polarcode | 1 | 273211090 | 9081291 | | TERIBERKA | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1995 | 12754 | 8.512999535 | 0 | 0 | 8448 | 5000 - 9999 GT | 6 | 4.77363121 | 75.45781527 | 238.2347121 | 0.409977395 | 2.386016392 | 0.316922826 | 743.8888889 | |
| 2023-03 | polarcode | 1 | 257785000 | 9197404 | | NORBJORN | NIS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 2000 | 3389 | 5.546000004 | 0 | 0 | 2528 | 1000 - 4999 GT | 6 | 2188.888444 | 59.33616793 | 187.8589473 | 0.439087649 | 2.657643124 | 0.249211902 | 396.2730556 | |
| 2023-03 | polarcode | 1 | 273386650 | 9044748 | | GRIGORY SHELIKHOV | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1992 | 12150 | 8.609999657 | 0 | 0 | 7949 | 5000 - 9999 GT | 6 | 1154.368386 | 65.14462329 | 206.2487619 | 0.449573065 | 3.076607874 | 0.273607419 | 270.6183333 | |
| 2023-03 | polarcode | 1 | 273137100 | 8729810 | | SEVMORPUT | RUS | FS Ice Class 1A | 5 | General cargo ships | A31 | General Cargo | A31A2GX | 1988 | 34615 | 11.80000019 | 0 | 0 | 38226 | 25000 - 49999 | 6 | 694.7870562 | 96.7418375 | 306.1731314 | 0.713991379 | 6.726065627 | 0.81492564 | 96.7672222 | |
| 2023-03 | polarcode | 1 | 273312530 | 9310018 | | ANTEY | RUS | FS Ice Class 1A | 10 | Offshore supply ships | B21 | Offshore Supply | B21B2OA | 2006 | 3867 | 8.5 | 0 | 85 | 5871 | 5000 - 9999 GT | 0 | 579.9455227 | 61.03984976 | 193.5983452 | 0.451694888 | 3.20960668 | 0.10987173 | 59.6641667 | |
| 2023-03 | polarcode | 1 | 273348020 | 9402407 | | TOBOY | RUS | FS Ice Class 1A | 10 | Offshore supply ships | B21 | Offshore Supply | B21B2OA | 2008 | 1930 | 9.300000191 | 75.19999695 | 0 | 4406 | 1000 - 4999 GT | 0 | 283.9422678 | 106.2700622 | 337.9024871 | 0.78639846 | 4.753641966 | 0.191286111 | 745.395 | |
| 2023-03 | polarcode | 1 | 273384430 | 9720720 | | | | | 10 | Offshore supply ships | B21 | Offshore Supply | | | | | | | | 1000 - 4999 GT | 0 | 1505.676443 | 263.0466131 | 834.6134815 | 1.946543814 | 11.81608523 | 0.47348363 | 570.2105556 | |
| 2023-03 | polarcode | 1 | 273394350 | 9777101 | | ALEKSANDR SANNIKOV | RUS | FS Ice Class 1A | 10 | Offshore supply ships | B21 | Offshore Supply | B21B2OT | 2018 | 4581 | 8 | 116.5 | 35 | 11295 | 10000 - 24999 | 6 | 208.0456566 | 222.0766098 | 702.014981 | 1.191371228 | 7.320016125 | 0.932721762 | 743.8216667 | |
| 2023-03 | polarcode | 1 | 257843000 | 9645932 | | ARCTIC PEARL | NOR | FS Ice Class 1C | 10 | Offshore supply ships | B21 | Offshore Supply | B21A2OS | 2013 | 3750 | 6.099999905 | 0 | 0 | 3963 | 1000 - 4999 GT | 0 | 722.5979433 | 47.83856177 | 151.9831838 | 0.354005371 | 2.143431284 | 0.086109417 | 531.8216667 | |
| 2023-03 | polarcode | 1 | 273318120 | 9307724 | | SCF SAKHALIN | RUS | FS Ice Class 1A Super | 10 | Offshore supply ships | B21 | Offshore Supply | B21A2OS | 2005 | 4298 | 7.5 | 93.93599701 | 0 | 440 | 6882 | 5000 - 9999 GT | 0 | 1255.844924 | 284.8175071 | 904.589266 | 1.78598764 | 12.16378218 | 0.512671513 | 625.8408333 |
| 2023-03 | polarcode | 1 | 273319940 | 9338230 | | HERMES | RUS | FS Ice Class 1A | 10 | Offshore supply ships | B21 | Offshore Supply | B21B2OA | 2006 | 3949 | 8 | 0 | 80 | 5871 | 5000 - 9999 GT | 0 | 22.42004482 | 161.1578465 | 513.3752897 | 0.676865401 | 3.903653247 | 0.290084124 | 744.275 | |
| 2023-03 | polarcode | 1 | 257564000 | 9690949 | | POLARSSVSEL | NOR | FS Ice Class 1B | 10 | Offshore supply ships | B21 | Offshore Supply | B21A2OS | 2014 | 3700 | 6.400000095 | 0 | 0 | 4324 | 1000 - 4999 GT | 0 | 527.2313067 | 43.23310981 | 138.0482989 | 0.319924948 | 1.917730486 | 0.077819641 | 743.9625 | |
| 2023-03 | polarcode | 1 | 273296430 | 9576181 | | MURMAN 1 | RUS | FS Ice Class 1A | 10 | Offshore supply ships | B21 | Offshore Supply | B21A2OS | 2010 | 1536 | 4.900000095 | 0 | 0 | 1840 | 1000 - 4999 GT | 0 | 1612.019965 | 65.47443444 | 207.7876572 | 0.484510815 | 2.939857883 | 0.117853982 | 328.2266667 | |
| 2023-03 | polarcode | 1 | 982575640 | 9690949 | | | | FS Ice Class 1B | 10 | Offshore supply ships | B21 | Offshore Supply | | | | | | | | 1000 - 4999 GT | 0 | 5.09337797 | 0.39983492 | 1.270742835 | 0.002958778 | 0.017901845 | 0.000719703 | 3.01777778 | |
| 2023-03 | polarcode | 1 | 258430000 | 9257591 | | NORSEL | NIS | FS Ice Class 1B | 15 | Oil product tankers | A13 | Oil | A13B2TP | 2003 | 3535 | 5.75 | 0 | 0 | 2490 | 1000 - 4999 GT | 6 | 3641.963633 | 132.2731252 | 418.2903612 | 0.978821125 | 5.898733372 | 0.555547119 | 560.7677778 | |
| 2023-03 | polarcode | 1 | 273340490 | 9000235 | | PANDAR | RUS | FS Ice Class 1A | 15 | Oil product tankers | A13 | Oil | A13B2TP | 1991 | 6810 | 7.510000229 | 108.4199982 | 0 | 5025 | 5000 - 9999 GT | 6 | 1901.495325 | 79.18340774 | 250.5628149 | 0.560616653 | 3.78666741 | 0.332570313 | 350.4205556 | |
| 2023-03 | polarcode | 1 | 273443770 | 7635347 | | ALISA | RUS | FS Ice Class 1A | 15 | Oil product tankers | A13 | Oil | A13B2TP | 1977 | 2174 | 4.776000023 | 0 | 0 | 1384 | 1000 - 4999 GT | 6 | 76.20343844 | 24.062772 | 75.86017632 | 0.178064513 | 1.060735558 | 0.101063643 | 665.3344444 | |
| 2023-03 | polarcode | 1 | 257702000 | 9200158 | | POLAR VIKING | NIS | FS Ice Class II | 15 | Oil product tankers | A13 | Oil | A13B2TP | 2000 | 2713 | 5.179999828 | 71.90000153 | 0 | 1685 | 1000 - 4999 GT | 6 | 2187.703918 | 58.66143597 | 185.6379498 | 0.434094626 | 2.622950145 | 0.246378027 | 498.5580556 | |
| 2023-03 | polarcode | 1 | 273312850 | 9353058 | | URARTU | RUS | FS Ice Class 1A | 15 | Oil product tankers | A13 | Oil | A13B2TP | 2009 | 3500 | 4.5 | 0 | 0 | 2897 | 1000 - 4999 GT | 6 | 1266.716562 | 92.93691553 | 293.6358667 | 0.687733177 | 4.130766918 | 1.39035045 | 743.8936111 | |
| 2023-03 | polarcode | 1 | 273357330 | 9585273 | | ENISEY | RUS | FS Ice Class 1A Super | 15 | Oil product tankers | A13 | Oil | A13B2TP | 2011 | 18902 | 10 | 160.2400055 | 0 | 16110 | 10000 - 24999 | 6 | 1157.088907 | 120.9470489 | 386.6987296 | 0.895008162 | 9.317604035 | 1.170160934 | 138.1163889 | |
| 2023-03 | polarcode | 1 | 273453010 | 8912508 | | ZALIV KRESTA | RUS | FS Ice Class 1B | 15 | Oil product tankers | A13 | Oil | A13B2TP | 1991 | 23480 | 10.329999992 | 160.8300018 | 0 | 14332 | 10000 - 24999 | 6 | 898.7694336 | 90.79252218 | 289.3301882 | 0.626890388 | 5.774707764 | 0.765071459 | 193.7133333 | |
| 2023-03 | polarcode | 1 | 273292090 | 9183831 | | NP DUDINKA | RUS | FS Ice Class 1A | 15 | Oil product tankers | A13 | Oil | A13B2TP | 2000 | 21871 | 8.810000442 | 155.8699951 | 0 | 14400 | 10000 - 24999 | 6 | 2601.954112 | 180.8474436 | 577.2758474 | 1.332686824 | 13.1938813 | 1.638363379 | 316.9430556 | |
| 2023-03 | polarcode | 1 | 331356000 | 6617790 | | MASIK SIORAQ | DEN | FS Ice Class 1A | 12 | Other activities | B33 | Dredging | B33B2DT | 1966 | 711 | 0 | 0 | 0 | 407 | < 1000 GT | 0 | 198.6444703 | 1.48720178 | 4.750525763 | 0.011005294 | 0.065436878 | 0.002676963 | 742.9341667 | |
| 2023-03 | polarcode | 1 | 331197000 | 5026619 | | HOLMI | DEN | FS Ice Class 1A | 12 | Other activities | B33 | Dredging | B33A2DG | 1961 | 457 | 3.503999949 | 0 | 0 | 335 | < 1000 GT | 0 | 0.799082073 | 5.964222844 | 19.12129843 | 0.04413525 | 0.262425807 | 0.0107356 | 745.1552778 | |

ASTD FTP SERVER

The table shows data fields for each ship downloaded from the ASTD FTP Server and compares each access level. All downloads are for one month, for the whole ASTD Area.

See example of how the data looks when downloaded on next page.

| DATA FIELD | LEVEL 1 | LEVEL 2 | LEVEL 3 | EXPLANATION | PAGE |
|-------------------|---------|---------|---------|---|-------|
| mmsi | YES | NO | NO | The identification number of the AIS-equipment on the vessel | 11 |
| imonumber | YES | NO | NO | IMO number of the ship | 11 |
| ship_id | NO | YES | YES | Id of the ship – unique for each month. | 11 |
| date_time_utc | YES | YES | YES | Date/time of the AIS message reported by the vessel | - |
| vesselname | YES | NO | NO | Name of the ship | 11 |
| flagname | YES | YES | YES | Name of the ship flag | 12 |
| flagcode | YES | YES | YES | Code for the ship flag | 12 |
| iceclass | YES | YES | YES | Ice class of the ship | 13 |
| sizegroup_gt | YES | YES | YES | Size of ship (ASTD aggregation) | 17 |
| gross_tonnage | YES | YES | YES | Registered gross tonnage of the ship | 17 |
| deadweight | YES | YES | NO | DWT of the ship | 17 |
| draught | YES | YES | NO | Draught of the ship | 17 |
| lengthregistered | YES | YES | NO | Length of the ship | 17 |
| passengercapacity | YES | YES | NO | Maximum passenger capacity | 17 |
| yearofbuild | YES | YES | YES | Year which a vessel was delivered to its original owner by a shipbuilder. | - |
| astd_cat | YES | YES | YES | Type of ship (ASTD aggregation) | 14-16 |
| lloyds3_cat | YES | YES | NO | Type of ship (Lloyds aggregation) | 14-16 |
| lloyds5_cat | YES | NO | NO | Type of ship (Lloyds aggregation) | 14-16 |
| arcticshiptype | YES | YES | YES | Ship types representative for the Arctic | |
| fuelquality | YES | YES | YES | Type of fuel used | 18-19 |
| fuelcons | YES | YES | YES | Fuel consumption in metric tons from last signal | 18-19 |
| co | YES | YES | YES | Co emissions in metric tons from last signal | 21 |
| co2 | YES | YES | YES | Co emissions in metric tons from last signal | 21 |
| so2 | YES | YES | YES | So2 emissions in metric tons from last signal | 21 |
| nox | YES | YES | YES | Nox emissions in metric tons from last signal | 21 |
| dist_nextpoint | YES | YES | YES | Distance sailed since last point in meters | 23 |
| sec_nextpoint | YES | YES | YES | Seconds from last point | 23 |
| longitude | YES | YES | YES | Longitude position signal | - |
| latitude | YES | YES | YES | Latitude position signal | - |

DATA EXAMPLE: FTP Server Data download – Level 1

Opened in Notepad++ - imported to Excel

| mmsi | imnumber | date_time_utc | vesselname | flagname | flagcode | iceclass | sizegroup_gt | gross_tonnage | deadweight | draught | length_registered | passenger_capacity | year_of_build | astd_cat | lloyds3_cat | lloyds5_cat | arcticshiptype | fuelquality | fuelcons | co2 | co | nox | so2 | dist_nextpoint | sec_nextpoint | longitude | latitude |
|-----------|----------|---------------------|--------------------|-----------------------------|----------|-----------------|----------------|---------------|------------|-------------|-------------------|--------------------|---------------|--------------------------------|-----------------------|---------------------------------|--------------------------------|-------------|----------|----------|----------|----------|----------|----------------|---------------|--------------|----------|
| 210803000 | 9374727 | 2025-07-31T09:47:17 | FRAKT SUND | Cyprus | CYP | | 1000 - 4999 GT | 2967 | 4450 | 6.21999979 | 84.81999969 | 0 | 2009 | General cargo ships | General Cargo | General Cargo Ship | General Cargo Ship | 6 | 0.000583 | 0.001836 | 4.31E-06 | 2.56E-05 | 2.45E-06 | 1.456 | 181 | 14.12524333 | 66.31695 |
| 230035990 | 7393640 | 2025-07-31T20:47:02 | OSTERN | Finland | FIN | | < 1000 GT | 474 | 41 | 3.089999977 | 0 | 150 | 1974 | Passenger ships | Passenger/Ro-Ro Cargo | Passenger/Ro-Ro Ship (Vehicles) | Passenger Ship | 0 | 0.000478 | 0.001534 | 3.54E-06 | 2.10E-05 | 8.61E-07 | 0.415 | 360 | 21.91178833 | 60.19415 |
| 231118000 | 8619522 | 2025-07-31T03:04:44 | EIVIND | Faeroes Islands | FAR | | < 1000 GT | 656 | 0 | 4.25 | 0 | 0 | 1988 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.002086 | 0.006687 | 1.54E-05 | 9.18E-05 | 3.75E-06 | 0.765 | 371 | -6.775341667 | 62.0063 |
| 231356000 | 9306017 | 2025-07-31T16:36:54 | HELGAFELL | Faeroes (Fas) | FAS | | 5000 - 9999 GT | 8990 | 11143 | 8.5 | 128.6799927 | 0 | 2005 | Container ships | Container | Container Ship (Fully Cellular) | Container Ship | 6 | 0.000834 | 0.002638 | 3.52E-06 | 1.99E-05 | 3.50E-06 | 0 | 10 | -21.83751667 | 64.14159 |
| 244091000 | 8650813 | 2025-07-31T08:06:05 | NOORDERLICHT | Netherlands | NTH | | < 1000 GT | 140 | 0 | 4 | 30.57999992 | 20 | 1910 | Cruise ships | Passenger | Passenger/Cruise | Cruise Ship | 0 | 0.001184 | 0.003775 | 8.76E-06 | 5.21E-05 | 2.13E-06 | 1004.278 | 369 | 14.42813333 | 78.18194 |
| 251039110 | 9050709 | 2025-07-31T01:32:36 | TJALDUR | Iceland | ICL | FS Ice Class 1C | < 1000 GT | 689 | 280 | 5 | 0 | 0 | 1992 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.00038 | 0.001219 | 2.81E-06 | 1.67E-05 | 6.85E-07 | 0.567 | 62 | -18.09308 | 65.69269 |
| 257006840 | 8960531 | 2025-07-31T16:12:55 | ANDOVFISK | Norway | NOR | | < 1000 GT | 120 | 0 | 2.700000048 | 0 | 0 | 1995 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.001227 | 0.003934 | 9.08E-06 | 5.40E-05 | 2.21E-06 | 0.392 | 361 | 31.03237333 | 70.36321 |
| 257341000 | 9665712 | 2025-07-31T05:23:53 | OLYMPIC ARES | Norway (Nis) | NIS | FS Ice Class 1C | 5000 - 9999 GT | 7888 | 7150 | 7.25 | 0 | 102 | 2013 | Other service offshore vessels | Other Offshore | Offshore Support Vessel | Other Service Offshore Vessels | 0 | 0.169538 | 0.53756 | 0.001255 | 0.008954 | 0.000305 | 2349.716 | 361 | 9.551776667 | 64.04486 |
| 265967000 | 7347627 | 2025-07-31T23:52:57 | ATLE | Sweden | SWD | | 5000 - 9999 GT | 7457 | 2570 | 9.079999924 | 96.01999664 | 61 | 1974 | Other activities | Other Activities | Icebreaker | Icebreaker | 6 | 0.003524 | 0.011234 | 1.48E-05 | 8.37E-05 | 6.34E-06 | 0.077 | 58 | 22.17104667 | 65.57174 |
| 576988000 | 8941808 | 2025-07-31T10:36:19 | REMBRANDT VAN RIJN | Vanuatu | VAN | | < 1000 GT | 308 | 350 | 2.609999895 | 39.02000046 | 36 | 1924 | Cruise ships | Passenger | Passenger/Cruise | Cruise Ship | 0 | 0.000287 | 0.000919 | 2.12E-06 | 1.26E-05 | 5.16E-07 | 4.325 | 181 | 11.62152667 | 79.85206 |
| 273295390 | 9207819 | 2025-07-31T08:50:08 | TSEFEY | Russia | RUS | FS Ice Class 1B | 1000 - 4999 GT | 1194 | 753 | 7.381999969 | 0 | 0 | 2000 | Other activities | Other Fishing | Fish Factory Ship | Fish Factory Trawler | 0 | 0.023868 | 0.075996 | 0.000177 | 0.001065 | 4.30E-05 | 2237.329 | 892 | 40.62563667 | 68.56197 |
| 275519000 | 9281786 | 2025-07-31T01:27:40 | NORDLAND | Latvia | LAV | FS Ice Class 1A | 1000 - 4999 GT | 3173 | 4525 | 5.75 | 92.74700165 | 0 | 2003 | General cargo ships | General Cargo | General Cargo Ship | General Cargo Ship | 6 | 0.01316 | 0.041709 | 9.74E-05 | 0.000592 | 2.63E-05 | 788.266 | 159 | 23.948745 | 65.29155 |
| 276829000 | 9773064 | 2025-07-31T22:05:23 | MEGASTAR | Estonia | ETN | FS Ice Class 1A | 25000 - 49999 | 49134 | 6080 | 7.099999905 | 0 | 2824 | 2017 | Passenger ships | Passenger/Ro-Ro Cargo | Passenger/Ro-Ro Ship (Vehicles) | Passenger Ship | 4 | 0.063676 | 0.202147 | 0.000281 | 0.001639 | 0.000127 | 0.262 | 362 | 24.91480333 | 60.148 |
| 319147200 | 9841392 | 2025-07-31T01:39:06 | HODOR | Cayman Islands | CAY | | 1000 - 4999 GT | 1582 | 249 | 2.276000023 | 0 | 0 | 2019 | Other activities | Other Activities | Supply Tender | Other Activities | 0 | 0.179124 | 0.574272 | 0.001326 | 0.007881 | 0.000322 | 53.593 | 31860 | -123.282335 | 48.43852 |
| 331095100 | 9199488 | 2025-07-31T02:10:09 | MASIK II | Denmark | DEN | | < 1000 GT | 139 | 32 | 2.299999952 | 0 | 0 | 1998 | Other activities | Other Activities | Patrol Vessel | Other Activities | 0 | 0.005721 | 0.018161 | 4.23E-05 | 0.000252 | 1.03E-05 | 2256.651 | 599 | -53.034855 | 65.13386 |
| 366959080 | 8856508 | 2025-07-31T02:27:34 | JEANOAH | United States Of America | USA | | < 1000 GT | 105 | 0 | 0 | 0 | 0 | 1970 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.1031 | 0.329025 | 0.000763 | 0.004536 | 0.000186 | 50082.866 | 17949 | -153.162605 | 58.0008 |
| 413212240 | 9860996 | 2025-07-31T11:37:43 | SHEN HAI YI HAO | China, People's Republic Of | CHR | FS Ice Class 1C | 1000 - 4999 GT | 4700 | 1704 | 5.800000191 | 0 | 0 | 2019 | Other activities | Research | Research Survey Vessel | Research Vessel | 0 | 0.059672 | 0.189638 | 0.000442 | 0.002672 | 0.000107 | 5492.181 | 1338 | -169.3794083 | 68.26696 |
| 441371000 | 7388310 | 2025-07-31T02:19:17 | NO. 99 OYANG | Korea, South | KRS | | 1000 - 4999 GT | 1703 | 1069 | 5.699999809 | 0 | 0 | 1976 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.615125 | 1.962266 | 0.004552 | 0.027338 | 0.001107 | 48496.492 | 11245 | 158.3546317 | 51.62219 |
| 636022067 | 9739276 | 2025-07-31T05:15:33 | CHEM SOL | Liberia | LIB | | 10000 - 24999 | 15717 | 25253 | 9.862000465 | 149.6600037 | 0 | 2017 | Chemical tankers | Chemical | Chemical/Products Tanker | Chemical Tanker | 6 | 1.034622 | 3.28008 | 0.005127 | 0.02964 | 0.002069 | 2.899 | 12960 | -122.868395 | 49.29045 |
| 218799000 | 9690688 | 2025-07-31T01:10:25 | MARK | Germany | GEU | FS Ice Class II | 1000 - 4999 GT | 4248 | 3159 | 6.5 | 80.40000153 | 0 | 2015 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.082748 | 0.263007 | 0.000612 | 0.003704 | 0.000149 | 2647.807 | 421 | -21.87654167 | 66.93821 |
| 232035412 | 9897157 | 2025-07-31T14:08:13 | WESTRA FJORD K193 | United Kingdom | GBI | | < 1000 GT | 421 | 0 | 4.5 | 0 | 0 | 2021 | Fishing vessels | Fish Catching | Fishing Vessel | Fishing Vessel | 0 | 0.045806 | 0.146039 | 0.000339 | 0.002015 | 8.25E-05 | 8002.013 | 5812 | -8.808475 | 61.19435 |

DOWNLOAD DATA DAMPLE FROM FTP SERVER

The data sample is for January 2015. It is almost 500mb unzipped and requires specialized software to open and work with.

[CLICK TO DOWNLOAD](#)

SHIP IDENTIFICATION

ASTD Contains several ways to identify vessels:

SHIP ID

The *ship_id* field contains a number for each ship. The *ship_id* is consistent for each ship per month, but changes between months.

MMSI

The MMSI number (Maritime Mobile Service Identity) is a unique nine-digit number for identifying a ship's AIS-equipment. It provides an internationally standardized number for contacting the vessel.

IMO NUMBER

A unique reference number is assigned to each ship for identification purposes, assigned by S&P Global on behalf of the IMO. ASTD contains the latest known IMO number for given MMSI whenever IMO number is not reported.

FISHING VESSEL NUMBER

Identification information for fishing vessels.

VESSEL NAME

ASTD contains names of ships, but as names are not unique, using IMO or MMSI is better for ship identification. The name is taken from the latest AIS report of the ship.

FOR ASTD
LEVEL 2 AND
LEVEL 3



AVAILABLE ON LEVEL 1 ONLY

FLAG CODES

- ASTD data includes “*Flag Codes*” for each ship. A Flag Code represents the national ship registry where the ship is registered. Some countries have more than one national ship registry.
- Users should match the Flag Code to the National Ship Registry if it is unknown to them.
- A document with ASTD Flag Codes is available to download [here](#).

EXAMPLE

The first two columns show ASTD data when downloaded. The National Ship Registry Column is made using the [Flag Code document](#).

| NAME OF SHIP | FLAG CODE | NATIONAL SHIP REGISTRY |
|---------------------|-----------|------------------------------------|
| SUNNANVIK | SWD | Sweden |
| SVYATOY PETR | RUS | Russia |
| ORASILA | DIS | Danish International Ship Registry |
| ISFJORD | NIS | Norway International Ship Registry |
| BRUARFOSS | FAS | Faroe Islands |
| BORIS SOKOLOV | CYP | Cyprus |
| SJOVEIEN | PAN | Panama |
| REMBRANDT VAN RIJN | VAN | Vanuatu |
| NATIONAL GEOGRAPHIC | BAH | Bahamas |
| ANTIGUA | NTH | Netherlands |
| OSTERFJORD | NOR | Norway |
| POLAR NATAARNAQ | DEN | Denmark |
| PISON | FAR | Faroe Islands |
| U. S. LIBERATOR | USA | United States |
| STEFFANO | ETN | Estonia |
| KIRKELLA | GBI | United Kingdom |
| CIDADE DE AMARANTE | PTG | Portugal |
| GERDA MARIA | GEU | Germany |
| TAURUS | LTH | Lithuania |
| SOLBERG | ICL | Iceland |
| MONTE MEIXUEIRO | SPN | Spain |
| NIKOLAY URVANTSEV | HKG | Hong Kong |
| DORADO 2 | LAV | Latvia |
| POLARFRONT | FIS | French International Ship Registry |

ICE CLASS OF SHIPS IN ASTD

- Ice class refers to a notation assigned by a classification society or a national maritime authority to denote the additional level of strengthening as well as other arrangements that enable a ship to navigate through sea ice. Some ice classes also have requirements for the ice-going performance of the vessel.
- ASTD ice classes are based on the Finnish-Swedish Ice Class Rules, which are cooperatively developed by the Finnish and Swedish maritime authorities.
- If ice class information is missing in the ASTD, the vessel does not have a registered ice class.

ICE CLASSES OF SHIPS: *Finnish-Swedish Ice Class Rules explained*

SHIP TYPE AGGREGATION

- S&P Global assigns and validates IMO numbers on behalf of the IMO. IMO Numbers are issued from the global maritime databases maintained by S&P Global and consist of a unique seven-digit number. S&P Global manages this Scheme on behalf of the IMO.
- ASTD uses the AIS number to identify each ship, including its type and characteristics.
- S&P Global uses the *Statcode 5 Shiptype Coding System* to assign ship types to each ship. ASTD uses the same system to aggregate ship types. See an example on next page.
- A document showing how ASTD aggregates ship types is available to [download here](#).

*S&P Global
website for
IMO number
scheme*

SHIP TYPE AGGREGATION: DATA FIELDS EXPLAINED

Data fields for ship types in ASTD are not the same in the ASTD System as in FTP Server. Here, all fields are explained.

ASTD SYSTEM

| | |
|------------------------------|---|
| norwegianshiptypeid | Refers to an id in the ASTD Database to match with the column below. Each id represents the name of a ship type. Available to all users. |
| norwegianshiptypename | Refers to the ship type aggregated from <i>lloyds5_cat</i> to 16 ship types, referred to as the <i>Norwegian ship type</i> or the <i>ASTD Ship type</i> . Available to all users. |
| lloydsshiptypeid | Refers to an id in the ASTD Database to match with the column below. Each id represents the name of a ship type. Available for ASTD Level I and Level II users. |
| lloydsshiptyname | Refers to the ship types aggregated from <i>lloyds5_cat</i> to 56 ship types. Available for ASTD Level I and Level II users. |
| lloyds5_cat | Refers to an ID at the highest level available, the ID is used to match with a ship type in the ASTD Ship Type document . Available for ASTD Level I users. |

FTP SERVER

| | |
|--------------------|---|
| astd_cat | Same as the <i>norwegianshiptyname</i> field. Refers to the ship type aggregated from <i>lloyds5_cat</i> to 16 ship types, referred to as the <i>Norwegian ship type</i> or the <i>ASTD Ship type</i> . Available to all users. |
| lloyds3_ | Same as the <i>lloydsshiptyname</i> field. Refers to the ship types aggregated from <i>lloyds5_cat</i> to 56 ship types. Available for ASTD Level I and Level II users. |
| lloyds5_cat | Refers to an ID at the highest level available, the ID is used to match with a ship type in the ASTD Ship Type document . Available for ASTD Level I users. |

SHIP TYPE AGGREGATION - EXAMPLE

| | StatCode Level 5 (Iloyds5_cat) | Level 5 Ship Type | StatCode Level 3 (Iloydsship typename & Iloyds3_) | Level 3 Ship Type | ASTD Ship Type (norwegianshiptypename & astd_cat) | Description |
|-------------------------|--|-----------------------------------|---|-------------------|---|--|
| | Available to ASTD Level 1 users | | Available to ASTD Level 2 users | | Available to ASTD Level 3 users | |
| CHEMICAL TANKERS | A12A2LP | Molten Sulphur Tanker | A12 | Chemical | Chemical tankers | A tanker for the bulk carriage of molten sulphur in insulated tanks at a high temperature |
| | A12A2TC | Chemical Tanker | A12 | Chemical | Chemical tankers | A tanker for the bulk carriage of chemical cargoes, lube oils, vegetable/animal oils and other chemicals as defined in the International Bulk Chemical Code. Tanks are coated with suitable materials which are inert to the cargo |
| | A12B2TR | Chemical/Products Tanker | A12 | Chemical | Chemical tankers | A chemical tanker additionally capable of the carriage of clean petroleum products |
| | A12C2LW | Wine Tanker | A12 | Chemical | Chemical tankers | A cargo ship designed for the bulk transport of wine in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers |
| | A12D2LV | Vegetable Oil Tanker | A12 | Chemical | Chemical tankers | A cargo ship designed for the bulk transport of vegetable oils in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers |
| | A12E2LE | Edible Oil Tanker | A12 | Chemical | Chemical tankers | A cargo ship designed for the bulk transport of edible oils in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers |
| | A12F2LB | Beer Tanker | A12 | Chemical | Chemical tankers | A tanker for the bulk carriage of beer |
| | A12G2LT | Latex Tanker | A12 | Chemical | Chemical tankers | A tanker for the bulk carriage of latex |
| | A14E2UJ | Fruit Juice Carrier, Refrigerated | A14 | Other Liquids | Chemical tankers | A tanker for the bulk carriage of fruit juice concentrate in refrigerated tanks. May be arranged for the additional carriage of containers on deck |
| | A14F2LM | Molasses Tanker | A14 | Other Liquids | Chemical tankers | A tanker for the bulk carriage of molasses |
| | A14G2LG | Glue Tanker | A14 | Other Liquids | Chemical tankers | A tanker for the bulk carriage of glue |
| | A14H2LH | Alcohol Tanker | A14 | Other Liquids | Chemical tankers | A tanker for the bulk carriage of alcohol |
| | A14N2LL | Caprolactam Tanker | A14 | Other Liquids | Chemical tankers | A tanker for the bulk carriage of caprolactam, a chemical used in the plastics industry for the production of polyamides |
| A22A2BN | Bulk/Caustic Soda Carrier (CABU) | A22 | Bulk Dry / Oil | Chemical tankers | A bulk carrier with certain holds arranged with tanks for the alternative (but not simultaneous) carriage of caustic soda | |

ARCTIC SHIP TYPES

- **ASTD has many different ship type aggregations assigned to ships.**
- **One of these is a new ship type aggregation called Arctic ship types.**
- **It reduces the “Other activities” ship type compared to before.**
- **Furthermore, it includes icebreakers, research vessels and tugs, whom are both frequent in the Arctic and specific to the region.**

| Arctic Ship types | ASTD Ship types |
|--------------------------------|--------------------------------|
| Bulk Carrier | Bulk carriers |
| Chemical Tanker | Chemical tankers |
| Container Ship | Container ships |
| Crude Oil Tanker | Crude oil tankers |
| Cruise Ship | Cruise ships |
| Fish Carrier | Fishing vessels |
| Fish Factory Trawler | Gas tankers |
| Fishing Vessel | General cargo ships |
| Gas Tanker | Offshore supply ships |
| General Cargo Ship | Oil product tankers |
| Icebreaker | Other activities |
| Offshore Supply Ships | Other service offshore vessels |
| Oil Product Tanker | Passenger ships |
| Other Activities | Refrigerated cargo ships |
| Other Fishing Vessels | Ro-Ro cargo ships |
| Other Service Offshore Vessels | |
| Passenger Ship | |
| Refrigerated Cargo Ship | |
| Research Vessel | |
| Ro-Ro Cargo Ship | |
| Tug | |
| Unknown | |

SHIP CHARACTERISTICS: EXPLAINED

| DEADWEIGHT | DRAUGHT | LENGTH REGISTERED | PASSENGER CAPACITY | GROSS TONNAGE | VESSEL SIZE DESCRIPTION |
|--|--|---|---|--|---|
| <p>Deadweight (dwt) - The weight in tonnes (1000 kg) of cargo, stores, fuel, passengers and crew carried by the ship when loaded to her maximum summer draught.</p> | <p>Maximum draught of vessel in Meters. Measured from the lowest point on the hull to the water level when at the maximum permissible summer load line.</p> | <p>Registered length in meters. The length of the vessel is measured from the furthest part of the bow and the centerline of the rudder stock. This is the value as displayed on the flag of registration certificate.</p> | <p>Total passenger capacity available (on deck and in berths).</p> | <p>Gross Tonnage is a function of the moulded volume of all enclosed spaces of the ship as per the 1969 International convention on tonnage measurement of ships.</p> | <p>ASTD also aggregates ships Gross Tonnage to seven categories:</p> <ul style="list-style-type: none">< 1000 GT1000 - 4999 GT5000 - 9999 GT10000 - 24999 GT25000 - 49999 GT50000 - 99999 GT>= 100000 GT |

ASTD FUEL INFORMATION: TYPES

As IMO changed the regulations on sulphur content in fuel as of 1.1.2020, fuel information in ASTD is different before and after that date.

The ASTD fuel type information refers to the main engine fuel.

[READ MORE:](#)

[IMO 2020 sulphur limit implementation - carriage ban enters into force](#)

[IMO: March 2020](#)

BEFORE 1.1.2020

Fuel information is categorized by six types of fuel. The data field fuelquality contains a number which is matched to the table below.

| | |
|---|--|
| 0 | Distillate marine fuel (MGO/MDO) |
| 1 | Residual marine fuel and heavy distillate (ISO-F-10 - 80) |
| 2 | Residual marine fuel (IFO-F-80 - 180) heavy fuel oil |
| 3 | Residual marine fuel (IFO-F-180 - 380 or above) heavy fuel oil |
| 4 | Liquid natural gas (LNG) |
| 5 | Battery power |

AFTER 1.1.2020

Fuel information is categorized by four types of fuel. The data field fuelquality contains a number which is matched to the table below.

| | |
|---|---|
| 0 | Distillate marine fuel (MGO/MDO) |
| 4 | Liquid natural gas (LNG) |
| 5 | Battery power |
| 6 | Residual marine fuel (replaced groups 1,2 and 3 into one from 2020. |

ASTD FUEL INFORMATION: CALCULATION

- Fuel consumption in ASTD is measured in Metric Tons.
 - For the ASTD System, the data is aggregated for the ship for the given month
 - For the FTP Server, the data is between AIS messages (positions), so users have to make their own calculations.
- To calculate fuel consumption, users can aggregate the *fuelcons* data field:

| DATA EXTRACTED FROM ASTD FTP SERVER: LEVEL 1 | date_time_utc | vesselname | fuelcons | dist_nextpoint | sec_nextpoint | longitude | latitude | |
|---|---|------------|--------------------|----------------|---------------|-----------|----------|--|
| | 7/10/2018 0:00 | ENNIBERG | 0.085419096 | 2321.344 | 361 | 25.58781 | 71.24021 | |
| | 7/10/2018 0:06 | ENNIBERG | 0.08438621 | 2339.384 | 369 | 25.65239 | 71.2412 | |
| | 7/10/2018 0:12 | ENNIBERG | 0.08385511 | 2303.604 | 361 | 25.71747 | 71.2422 | |
| | 7/10/2018 0:18 | ENNIBERG | 0.08198549 | 2314.87 | 370 | 25.78157 | 71.24303 | |
| | 7/10/2018 0:24 | ENNIBERG | 0.0791576 | 2248.606 | 361 | 25.84601 | 71.24377 | |
| | <i>Points from rest of day excluded from this example</i> | | | | | | | |
| | 7/10/2018 23:33 | ENNIBERG | 0.018696176 | 674.0636 | 370 | 32.37227 | 70.25326 | |
| | 7/10/2018 23:39 | ENNIBERG | 0.081220426 | 2302.133 | 369 | 32.38686 | 70.24977 | |
| | 7/10/2018 23:45 | ENNIBERG | 0.078736156 | 2243.539 | 361 | 32.44735 | 70.25248 | |
| 7/10/2018 23:51 | ENNIBERG | 0.08243172 | 2320.164 | 370 | 32.50608 | 70.25566 | | |
| 7/10/2018 23:57 | ENNIBERG | 0.08749976 | 2378.666 | 370 | 32.56686 | 70.25887 | | |
| <i>Total fuel consumption:</i> | | | <i>12.82841752</i> | | | | | |

**RESULT: THE
FISHING VESSEL
ENNINBERG
CONSUMED 12.83
METRIC TONS OF
FUEL FROM 00:00
AND 23:57 ON
OCTOBER 7th
2018.**

DISTANCE SAILED

- Sailed distance calculates the distance a ship sails
- ASTD System Download: Aggregated for a specific ship, per month, in nautical miles.
 - FTP Server: Not aggregated, only the distance to the next AIS point is shown (in meters).
- To calculate sailed distance from the ASTD System Download, users can aggregate the *distance_nm* data field.

DATA DOWNLOADED FROM ASTD SYSTEM ON LEVEL 3: REFRIGERATED CARGO SHIPS IN AUGUST 2023 IN THE POLAR CODE AREA

Result: All Refrigerated cargo ships which operated in the Arctic Polar Code Area in August 2023 sailed a total of **28.385 nautical miles**.

| ship_id | distance_nm |
|--------------|--------------------|
| 678752641 | 447.4422192 |
| 1183955587 | 445.7237171 |
| 1214378204 | 389.3965853 |
| 205541528 | 1582.607832 |
| 2085431710 | 1513.316357 |
| 292651238 | 125.2485653 |
| 1177992752 | 89.7315324 |
| 1396719016 | 922.2421118 |
| 4318144 | 1258.947736 |
| 1218720291 | 509.6022576 |
| 1422359902 | 673.0680113 |
| 2059886045 | 244.2860778 |
| 898781001 | 277.363304 |
| 1700004637 | 301.7671874 |
| 1485251942 | 702.4789104 |
| 376172036 | 33.77325108 |
| 1253950234 | 732.6287462 |
| 1276410740 | 927.6464768 |
| 358526016 | 740.9039854 |
| 308721009 | 766.8940497 |
| 1160713059 | 413.2701388 |
| 1467375841 | 975.1508747 |
| 2027878929 | 3770.898587 |
| 1505855006 | 234.841567 |
| 1183617473 | 491.8889077 |
| 1904386502 | 678.8842883 |
| 201153845 | 187.3589428 |
| 1490585635 | 745.1513974 |
| 254501721 | 330.9877187 |
| 497699630 | 1464.604928 |
| 577931545 | 737.7206814 |
| 1767508517 | 590.4060821 |
| 1324293047 | 881.1826971 |
| 265411885 | 145.7432748 |
| 1138715978 | 495.7164811 |
| 1339556273 | 185.9946031 |
| 1375739116 | 92.66961393 |
| 1914139368 | 2679.687118 |
| 1198891381 | 597.7129195 |
| Total | 28384.93974 |

ASTD SHIP EMISSIONS

ASTD contains ship emission calculations for Co2, CoE, Nox and So2. All units are in metric tons.

- For the ASTD System Download: Calculations are for each ship for the chosen month/year
 - For the FTP Server: Emissions for the distance between this and previous point/AIS message.
- Users conduct own calculations.

To calculate emissions from the ASTD System Download, users can aggregate the data fields between the desired period, as this example shows:

DATA DOWNLOADED FROM ASTD SYSTEM: LEVEL 1 10 (OUT OF 65) BULK CARRIERS IN THE POLAR CODE AREA IN AUGUST 2023

| mmsi | imonumber | vesselname | co2emission | coemission | noxemission | so2emission |
|-------------------------|-----------|-----------------|-------------|-------------|-------------|-------------|
| 352001477 | 9838838 | ADMIRAL SCHMIDT | 210.8116043 | 0.449314514 | 4.12410675 | 0.526969641 |
| 273614220 | 9741724 | ALARA | 476.3633349 | 1.056313769 | 10.15401637 | 1.312188728 |
| 636015170 | 9593476 | AM GHENT | 587.4620307 | 1.355339542 | 14.13911671 | 1.767071576 |
| 538005067 | 9624122 | AM KRAKOW | 209.820003 | 0.485785507 | 5.012890065 | 0.626921281 |
| 354260000 | 9434515 | AMSTEL TIGER | 238.9055975 | 0.538181807 | 5.455265719 | 0.701509073 |
| 636022382 | 9407471 | ANNA-ELISABETH | 57.66534302 | 0.131440433 | 1.333915206 | 0.169133099 |
| 319147600 | 9514406 | ANNA-META | 177.9319175 | 0.358157133 | 3.148739562 | 0.455341601 |
| 316044196 | 9854698 | ARVIK I | 695.7069006 | 1.55948652 | 15.32886935 | 1.971832246 |
| 354437000 | 9839076 | DREAM SKY | 407.8454429 | 0.924950259 | 9.446625361 | 1.207477421 |
| 273212240 | 9079169 | ENISEY | 777.5341135 | 1.762230281 | 17.87787617 | 2.282459572 |
| Total emissions: | | | 3840 | 9 | 86 | 11 |

ASTD SHIP EMISSIONS - DISCLAIMER

Please note that the emission estimates in the ASTD Program are less accurate after January 1, 2020, compared to earlier data. The reason are changes in international regulations on permitted sulphur content in marine fuels, known as “IMO 2020” ([link](#)) and regulated in Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). These changes led to significant modifications in marine fuel formulations, which affects emissions and are not sufficiently accounted for in the current estimates.

OPERATION HOURS

The ASTD System provides calculations for time spent in a given area. Note that this refers to when ships have their AIS transponders turned on. The units are in hours. To calculate operational hours, users can aggregate the data field *operationhour*.

General Cargo Ships in the Greenlandic EEZ in August 2023, from ASTD System Download - Level 1.

| mmsi | imonumber | vesselname | operationhour |
|-----------|-----------|---------------------|---------------|
| 219024883 | 7600287 | NORTH VIKING | 451.425 |
| 219027854 | 9854636 | SIUANA ARCTICA | 743.985 |
| 219027908 | 9854648 | MALERAQ ARCTICA | 743.9686111 |
| 219029632 | 9881421 | TILIOQ ARCTICA | 744.6719444 |
| 219029633 | 9881419 | ARPAARTI ARCTICA | 743.9797222 |
| 219364000 | 9618161 | NANOQ ARCTICA | 289.7886111 |
| 219663000 | 9618159 | MINIK ARCTICA | 745.5505556 |
| 219667000 | 9618147 | IVALO ARCTICA | 744.7972222 |
| 219668000 | 9618135 | MALIK ARCTICA | 408.4030556 |
| 228443600 | 9961659 | PERSEVERANCE | 213.4241667 |
| 244693000 | 9365659 | AMERICABORG | 18.07055556 |
| 244750715 | 9546473 | TIBERBORG | 77.17194444 |
| 245634000 | 9466374 | ALASKABORG | 86.24416667 |
| 246263000 | 9466336 | AMURBORG | 84.77666667 |
| 246519000 | 9466300 | ALBANYBORG | 33.74888889 |
| 246556000 | 9333539 | ARNEBORG | 51.00083333 |
| 366750000 | 9210309 | MAJ RICHARD WINTERS | 370.8005556 |
| 367535950 | 9437335 | OCEAN GIANT | 78.64777778 |
| | | | 6630 |

Result: General Cargo ships spent 6630 hours in the Greenlandic EEZ in August 2023. On average, the 18 ships spent 15 hours in the EEZ.

AIS

Automatic Identification System

AIS is a maritime navigation safety communications system standardized by the International Telecommunication Union (ITU) and adopted by the International Maritime Organization (IMO) to provide information about ship type, position (recorded every 6 minutes in ASTD), course, speed, navigational status, and other safety-related information.

SOLAS regulation 19 requires AIS to be fitted aboard all ships of 300 or more gross tonnage engaged on international voyages; cargo ships of 500 or more gross tonnage not engaged on international voyages; and all passenger ships irrespective of size. SOLAS regulation 19 became effective 31 December 2004.

[IMO: Automatic identification systems \(AIS\)](#)

AIS TRANSCEIVERS

Automatic identification system (AIS) transceivers automatically provide position, identification and static data (vessel details) to nearby ships, land based stations and satellites. There are two types of AIS transceivers: Class A and Class B.

Class A transceivers transmit with a power of 12.5W. Position is reported autonomously every 2-10 seconds dependent on the vessel's speed and/or course changes (every three minutes or less when at anchor or moored); and the vessel's static and voyage related information every 6 minutes. Class A transceivers are also capable of text messaging safety related information and AIS Application Specific Messages, such as meteorological and hydrological data, electronic Broadcast Notice to Mariners, and other marine safety data.

Class B transceivers do not meet the SOLAS 19 regulation requirements, but provide similar benefits to smaller vessels at a lower cost and with a simpler installation. Generally they report less frequently than Class A transceivers. Transmit power is 2W. They can receive safety related text and application specific messages but cannot transmit them. The vessel's static data is reported, however none of the voyage related information is.

[Types Of Automatic Identification Systems \(Per ITU-R M.1371 And IEC Standards\) | Navigation Center \(uscg.gov\)](#)

ASTD only includes signals transmitted by ships carrying AIS Class A transceivers. Thus, ASTD includes information on all ships that are required to carry AIS Class A transponders as well as any other ships not subject to SOLAS Regulation 19 that voluntarily opt to carry AIS Class A transceivers.

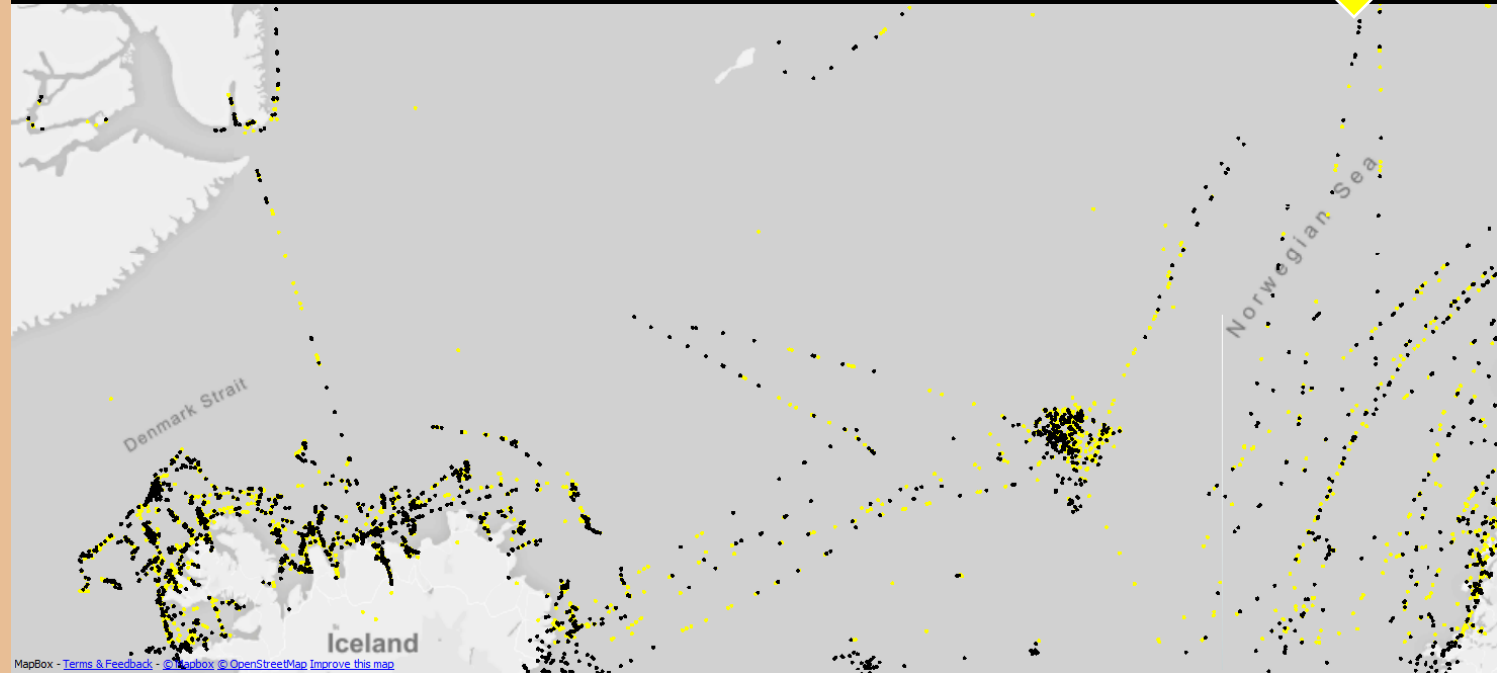
General AIS Limitations

AIS data in the ASTD System does not cover 100% of all ship traffic, but data quality is very high. This has been confirmed by comparing ASTD System data with data from other sources, including national collected information. Identifying pleasure craft and smaller fishing vessels can be challenging because these vessels are not required to carry AIS Class A transceivers.

In addition, numerous factors can affect the transmission and/or receipt of AIS signals, including:

- Technical failures due to faulty infrastructure (vessel and data flow)
- Erroneous onboard installation of AIS transceiver
- Problems with data links/networks
- Manipulation of AIS signals
- Data noise
- Satellite coverage limitations

The image below shows how AIS Class A transceiver data from the USA (yellow dots) supplements AIS Class A transceiver data from Norway (black dots) to give ASTD a more detailed and accurate picture of ship traffic.



ASTD Data Quality

The data in ASTD is very accurate. The data collected is vast, hundreds of gigabytes every year. Approximately 4 million records are added to the database every 24 hours. As outlined on page 18 of this document, AIS signals are not 100% accurate.

There are many variables which affect databases like ASTD. When comparing data between AIS databases, the information might not be 100% aligned. For example, there could be differences in the number, position and range in satellites which collect AIS signals. Data quality in ASTD is very high.

Working with ASTD Data

Data downloaded from the ASTD FTP requires sufficient computing capacity and the expertise of a GIS analyst.

Examples of software programs needed to work with ASTD data include CSV Explore, Python, or SQL databases like MySQL and PostgreSQL.

Keep this in mind when downloading large amounts of data.

However, smaller data samples can be downloaded by regular users, not specific GIS experts, and analyzed Excel. One has to download data and convert from CSV but from there analysis can be performed.

Please be careful with calculations to only use correct data.

Working with Data – “Data cleaning”

Please note that specific corrections are needed after downloading data to have as correct data as possible.

Satellites in orbit may pick up AIS signals from vessels located outside the geographic area covered by ASTD under certain atmospheric conditions.

In reports which the ASTD System can automatically generate, the ASTD System filters out all AIS Class A transceiver signals from ships for which satellites have picked up fewer than 10 positions in one month. ASTD users who download data from the FTP server for analysis must filter out this type of information themselves.

Please be aware when downloading data from the FTP server, data cleanup must be undertaken by the user to remove anomalies and other signals which could result in inaccurate analysis.



PAME

Protection of the Arctic Marine Environment



More information: hjalti@pame.is