

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) System 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.

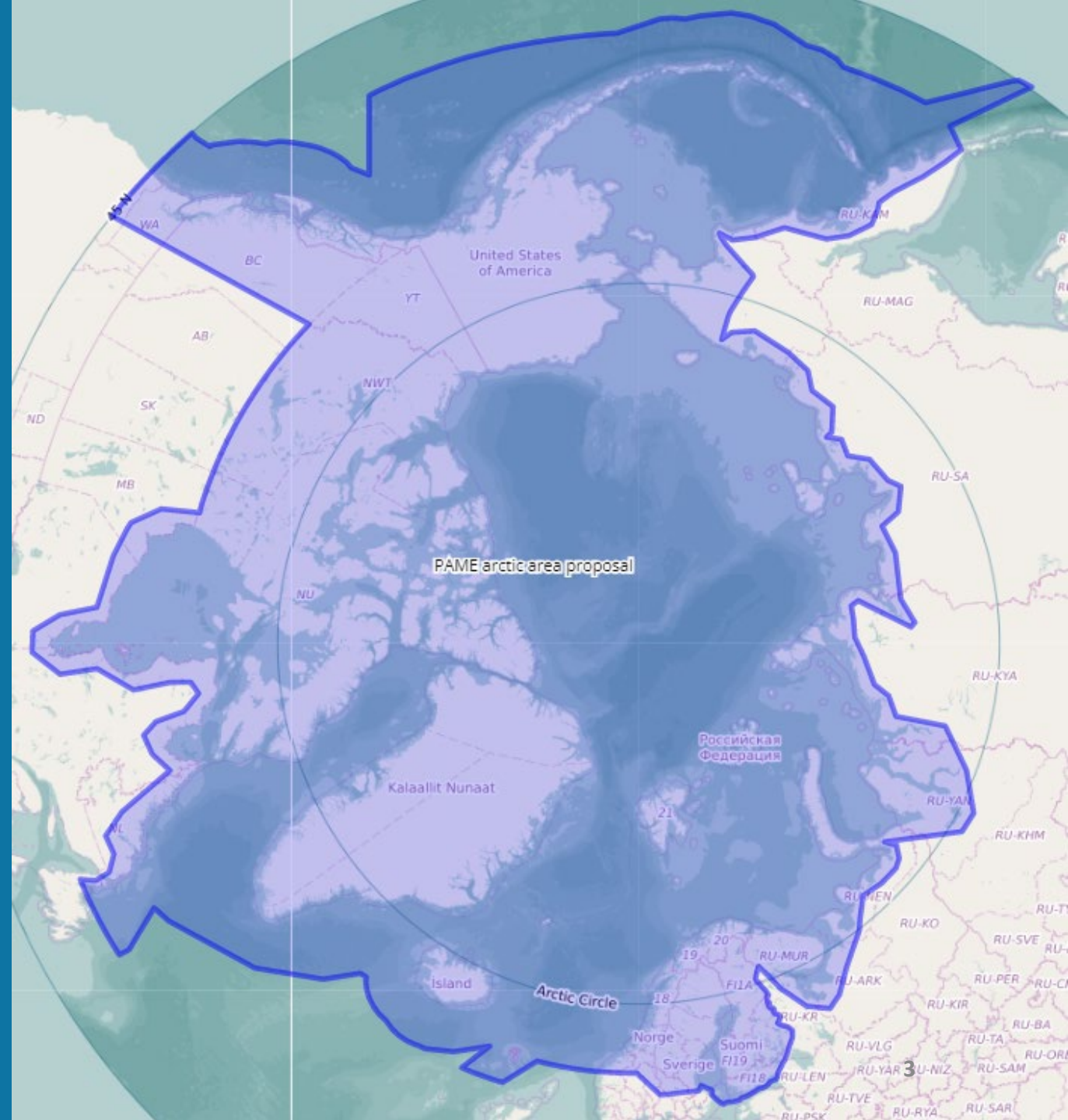
1.4: March 2021.

1.5: November 2022

1.6: January 2023



Data from ASTD is collected with over 20 satellites and multiple base stations. Data is collected from a specific area, shown on the map to the right.



ASTD Data

The data from ASTD can be accessed by two means:

ASTD SYSTEM

- ✓ Easy access to data
- ✓ Quick analysis on pre-defined area
- ✓ Data is pre-calculated
- ✓ Simple to use

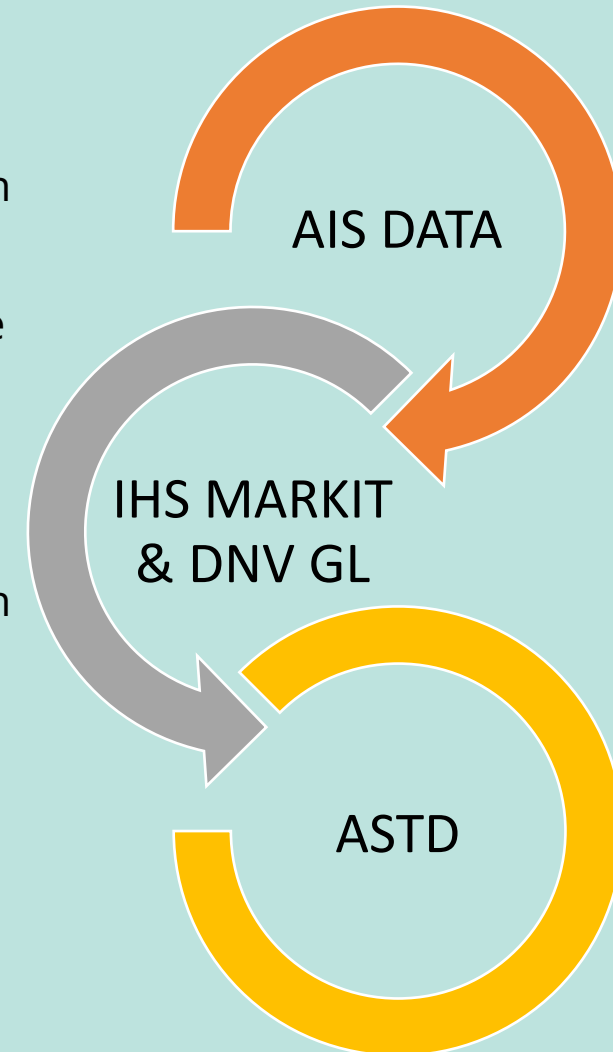
FTP SERVER

- ✓ Area from whole of ASTD area
- ✓ Data needs to be filtered, cleaned
- ✓ Needs professional GIS experts
- ✓ Vast amounts of data
- ✓ Intended for specific analysis
- ✓ Contact PAME for access

ASTD DATA

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

1. Automatic Identification System (AIS data) from ships operating in the Arctic. Satellites from USA and Norway.
2. Ship characteristic information (e.g., type, size, flag, gross tonnage, ownership, construction date) from S&P Global (formerly IHS Markit). Since 1760 Lloyds Register collected information on ships and maintained a collective ship registry. In 2009 IHS acquired Lloyds Register. S&P Global is a company servicing the IMO for a database of ships, and is the sole issuer of IMO numbers, contained in AIS information. An IMO number is a unique number to each ship. The IMO ship identification number scheme was introduced in 1987 as a measure to enhance ship safety and security. It assigned a permanent number to each ship for identification purposes. That number would remain unchanged through the ships life. These numbers appear on Port State Control required ships documentation such as the CSR – Continuous Synopsis Record, ISM and ISPS certificates*. From this, information in the table on page 6 is generated.
3. Information on the types of fuel ships are burning and calculated air emissions from such combustion are obtained from DNV. DNV made these calculations on IMO emission factors. DNV is the world's largest classification society and a recognized advisor for the maritime industry. See page 10.
4. Sea ice data from the National Snow and Ice Data Center (NSIDC). ASTD contains monthly sea ice extent information obtained from the [NSIDC Sea Ice Index](#).



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, have to pay a small fee for access to ASTD. A document which outlines the access has been created and is available [here](#).
- Access to ASTD data may be granted to eligible applicants at one of three access levels: Level I, Level II and Level III

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 table on
page 7 what
is included in
the ASTD
Data for each
access level.*

ASTD DATA ACCESS LEVELS

Data fields for each ship in ASTD. See example of data on page 8.

DATA FIELD	LEVEL 1	LEVEL 2	LEVEL 3	EXPLANATION
mmsi	YES	NO	NO	MMSI Number
imonumber	YES	NO	NO	IMO Number
shipid	NO	YES	YES	Ship number in the file downloaded. The number is unique for each month.
date_time_utc	YES	YES	YES	Date and time of signal
vesselname	YES	NO	NO	Name of ship.
flagname	YES	YES	YES	Flag of the ship or ship registry. See page 11.
iceclass	YES	YES	YES	Ice class (PC polar ice classes). See page 12.
astd_cat	YES	YES	YES	Type of ship. See pages 13 and 14.
lloyds3_cat	YES	YES	NO	Type of ship. See pages 13 and 14.
lloyds5_cat	YES	NO	NO	Type of ship. See pages 13 and 14.
sizegroup_gt	YES	YES	YES	Ship Size (in gross tons). See page 9.
fuelquality	YES	YES	YES	Type of fuel used (see page 10)
fuelcons	YES	YES	YES	Fuel Consumption
dist_nextpoint	YES	YES	YES	Distance to next point
sec_nextpoint	YES	YES	YES	Seconds to next point
longitude	YES	YES	YES	Longitude
latitude	YES	YES	YES	Latitude
co	YES	YES	YES	Carbon monoxide
Co2	YES	YES	YES	Carbon dioxide
so2	YES	YES	YES	Sulfur dioxide
nox	YES	YES	YES	Nitric oxide

DATA EXAMPLE: Data download function – Level 1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
	period	area_type	area_id	area_name	mmsi	imonumber	vesselname	flagcode	iceclass	norwegians hiptypeid	norwegianshiptypename	lloydsship typeid	lloydsshiptypename	lloyds5_cat	vesselsizeid	vesselsizedescription	fuelquality	distance_nm	consumption	co2emission	coemission	noxemission	so2emission	operationhour
1	2013-04	polarcode	1	Polarcode area	273296700	8134912	ACHINSK	RUS		13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	387.975346	10.2065183	32.3546631	0.07552823	0.45133116	0.01837173	153.8761111
2	2013-04	polarcode	1	Polarcode area	331168000	9228928	AKAMALIK	DEN	FS Ice Class 1B	13	Fishing vessels	B11	Fish Catching	B12A2FF	2	1000 - 4999 GT	0	1615.87621	74.2301087	235.309445	0.5493028	3.29113852	0.1336142	719.3272222
3	2013-04	polarcode	1	Polarcode area	273349220	8811015	AKHILLES	RUS		15	Oil product tankers	A13	Oil	A13B2TP	2	1000 - 4999 GT	1	104.802355	1.94329452	6.16024364	0.01438038	0.08586554	0.00816184	97.20555556
4	2013-04	polarcode	1	Polarcode area	273849700	9055216	ALANETT	RUS	FS Ice Class II	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	166.886043	7.20506771	22.8400646	0.0533175	0.31794896	0.01296912	115.0858333
5	2013-04	polarcode	1	Polarcode area	273443790	7720025	ALIOT	RUS	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	563.983912	8.55310881	27.1133549	0.06329301	0.37633679	0.0153956	124.7077778
6	2013-04	polarcode	1	Polarcode area	273429300	9076222	ANDROMEDA	RUS		13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	1072.6771	15.378587	48.7501209	0.11380154	0.67665783	0.02768146	353.0461111
7	2013-04	polarcode	1	Polarcode area	273312530	9310018	ANTEY	RUS		10	Offshore supply ships	B21	Offshore Supply	B21B2OA	3	5000 - 9999 GT	0	985.098539	231.61864	734.231088	1.71397794	10.8462793	0.41691355	485.9561111
8	2013-04	polarcode	1	Polarcode area	273311280	8616221	AQUAMARINE	RUS		13	Fishing vessels	B11	Fish Catching	B12A2FF	2	1000 - 4999 GT	0	211.931313	12.4092362	39.3372788	0.09182835	0.5500658	0.02233663	68.0175
9	2013-04	polarcode	1	Polarcode area	273219900	7604403	ARCTIC PRINCESS	RUS		8	Refrigerated cargo ships	A34	Refrigerated Cargo	A34A2GR	2	1000 - 4999 GT	1	205.591365	6.79479816	21.5395102	0.0502815	0.30074522	0.02853814	273.5475
10	2013-04	polarcode	1	Polarcode area	258535000	9258739	ARCTIC SWAN	NOR	FS Ice Class 1B	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	2341.9418	118.777312	376.52408	0.8789521	5.29994933	0.21379916	658.1366667
11	2013-04	polarcode	1	Polarcode area	231053000	8517437	ARCTIC VIKING	FAR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	2025.45609	86.64113	274.652382	0.64114436	3.83629198	0.15595403	614.1652778
12	2013-04	polarcode	1	Polarcode area	224871000	8617469	AROSA NUEVE	SPN	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	1068.92061	13.7096945	43.4597315	0.10145174	0.60322656	0.02467745	409.7125
13	2013-04	polarcode	1	Polarcode area	341049000	8860444	ASIAN ENTERPRISE	SKN		8	Refrigerated cargo ships	A34	Refrigerated Cargo	A21A2BC	3	5000 - 9999 GT	1	181.656708	28.9922618	91.9054698	0.21454273	1.30882491	0.12176748	359.4775
14	2013-04	polarcode	1	Polarcode area	352986000	9648491	ASTRA-G	PAN		12	Other activities	B31	Research	B31A2SR	1	< 1000 GT	2	1040.69866	5.19044797	16.4537201	0.03840931	0.22837971	0.00934281	265.4608333
15	2013-04	polarcode	1	Polarcode area	316323000	9252515	ATLANTIC ENTERPRISE	CAN	FS Ice Class 1B	13	Fishing vessels	B11	Fish Catching	B12A2FF	2	1000 - 4999 GT	0	441.419929	46.934891	148.783604	0.34731819	2.06613296	0.0844828	200.7741667
16	2013-04	polarcode	1	Polarcode area	257591000	9239355	ATLANTIC GUARDIAN	NIS		12	Other activities	B34	Other Activities	B34D2SB	3	5000 - 9999 GT	0	1005.68958	20.5852283	65.2551736	0.15233069	0.98850497	0.03705341	374.2336111
17	2013-04	polarcode	1	Polarcode area	258563000	9134555	ATLANTIC STAR	NOR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	242.50584	22.4048219	71.0232856	0.16579568	0.99005484	0.04032868	139.4513889
18	2013-04	polarcode	1	Polarcode area	273436830	6808674	AZURIT	RUS		13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	405.773216	0.91125949	2.88869258	0.00674332	0.04009542	0.00164027	157.1944444
19	2013-04	polarcode	1	Polarcode area	273148810	7808334	BELOMORYE	RUS	FS Ice Class II	8	Refrigerated cargo ships	A34	Refrigerated Cargo	A34A2GR	2	1000 - 4999 GT	1	840.653884	23.6767626	75.0553374	0.17520804	1.04776008	0.0994424	419.7719444
20	2013-04	polarcode	1	Polarcode area	273217010	8620179	BOOTES	RUS	FS Ice Class 1B	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	165.999611	10.0124344	31.739417	0.07409201	0.44591782	0.01802238	40.51222222
21	2013-04	polarcode	1	Polarcode area	273451570	7720001	BOREY	RUS	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	373.828783	5.63602399	17.866196	0.04170658	0.24798506	0.01014484	63.18111111
22	2013-04	polarcode	1	Polarcode area	263516000	7107431	BRYTES	PTG		13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	603.305897	10.6353492	33.714057	0.07870158	0.47348591	0.01914363	119.8536111
23	2013-04	polarcode	1	Polarcode area	273317810	7700087	CANOPUS	RUS	FS Ice Class II	8	Refrigerated cargo ships	A34	Refrigerated Cargo	A34A2GR	2	1000 - 4999 GT	1	356.147301	20.260546	64.2259307	0.14992804	0.89388276	0.0850943	456.6391667
24	2013-04	polarcode	1	Polarcode area	273358310	8401236	CAPTAIN STAROSTIN	RUS	FS Ice Class 1A	5	General cargo ships	A31	General Cargo	A31A2GX	2	1000 - 4999 GT	1	31.5669737	6.39359221	20.2676873	0.04731258	0.28240096	0.02685309	121.5075
25	2013-04	polarcode	1	Polarcode area	263501000	8803537	CIDADE DE AMARANTE	PTG		13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	1087.9862	24.570772	77.8893473	0.18182371	1.08795068	0.04422739	259.1941667
26	2013-04	polarcode	1	Polarcode area	273559500	9076636	DISTINKT	RUS		13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	1174.18618	18.7385779	59.4012918	0.13866548	0.82449743	0.03372944	395.3813889
27	2013-04	polarcode	1	Polarcode area	273357330	9585273	ENISEY	RUS	FS Ice Class 1A Supe	15	Oil product tankers	A13	Oil	A13B2TP	4	10000 - 24999	2	2771.43524	280.029327	895.554654	2.07221702	21.4932607	3.3249848	366.2658333
28	2013-04	polarcode	1	Polarcode area	231045000	8816974	ENNI-BERG	FAR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B12A2FF	2	1000 - 4999 GT	0	1484.23231	84.013226	266.321926	0.62169787	3.70497467	0.15122381	586.5691667
29	2013-04	polarcode	1	Polarcode area	257563600	9234563	FISKENES	NOR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	601.221313	6.95500005	22.0473502	0.051467	0.30602	0.012519	489.3408333
30	2013-04	polarcode	1	Polarcode area	259457000	9169263	FJELLMØY	NOR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	592.56299	7.35990514	23.3308993	0.05446633	0.32383583	0.01324783	215.4666667
31	2013-04	polarcode	1	Polarcode area	257105000	9260316	G. O. SARS	NOR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	385.177344	26.9301987	85.3687298	0.19928347	1.2059942	0.04847436	85.71666667
32	2013-04	polarcode	1	Polarcode area	231751000	8615318	GADUS	FAR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	589.62826	27.3656013	86.7489561	0.20250545	1.20587216	0.04925808	484.4677778
33	2013-04	polarcode	1	Polarcode area	273514800	8721935	GEMMA	RUS		13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	449.475916	7.12840098	22.5970311	0.05275017	0.31364964	0.01283112	140.9541667
34	2013-04	polarcode	1	Polarcode area	211214200	8716928	GERDA MARIA	GEU		13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	793.040731	43.2405378	137.072505	0.31997998	1.90492366	0.07783297	446.9027778
35	2013-04	polarcode	1	Polarcode area	354498000	8521658	GLOMAR 4-WINDS	PAN		11	Other service offshore vess	B22	Other Offshore	B22G2OY	1	< 1000 GT	0	835.922832	3.29540003	10.4464181	0.02438596	0.1449976	0.00593172	189.5108333
36	2013-04	polarcode	1	Polarcode area	259050000	9312107	HARSTAD	NOR		12	Other activities	B34	Other Activities	B34H2SQ	2	1000 - 4999 GT	0	261.022847	6.24847899	19.8076784	0.04623874	0.27739805	0.01124726	104.065
37	2013-04	polarcode	1	Polarcode area	257461000	9418042	HAVILA JUPITER	NOR	FS Ice Class 1C	10	Offshore supply ships	B21	Offshore Supply	B21B2OA	3	5000 - 9999 GT	0	80.0465953	48.5426763	153.880284	0.3592158	2.16270316	0.08737682	81.0577778
38	2013-04	polarcode	1	Polarcode area	257524500	7817256	HAVSEL	NOR		12	Other activities	B12	Other Fishing	B12E2FX	1	< 1000 GT	0	265.383041	6.19658452	5.37817292	0.01255473	0.07464972	0.00305385	126.2544444
39	2013-04	polarcode	1	Polarcode area	257471500	8716655	HELMER HANSSSEN	NOR	FS Ice Class 1C	12	Other activities	B31	Research	B31A2SR	2	1000 - 4999 GT	0	567.262329	17.2449765	54.6665757	0.12761283	0.76746346	0.03104096	100.5002778
40	2013-04	polarcode	1	Polarcode area	258410000	9230036	HERMES	NOR	FS Ice Class 1B	13	Fishing vessels	B11	Fish Catching	B12A2FF	2	1000 - 4999 GT	0	964.376688	33.7645248	107.033544	0.24985714	1.50696802	0.06077614	181.7538889
41	2013-04	polarcode	1	Polarcode area	273319940	9338230	HERMES	RUS		12	Other activities	B32	Towing / Pushing	B21B2OA	3	5000 - 9999 GT	0	639.714343	122.909721	389.623817	0.90953198	5.91957755	0.2212375	586.4472222
42	2013-04	polarcode	1	Polarcode area	231042000	8609357	HOGABERG	FAR	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	2	1000 - 4999 GT	0	679.154768	61.1851578	193.95695	0.45277017	2.69941248	0.11013328	458.625
43	2013-04	polarcode	1	Polarcode area	273445430	7383011	HUGINN	RUS	FS Ice Class 1C	13	Fishing vessels	B11	Fish Catching	B11B2FV	1	< 1000 GT	0	1348.10112	11.1928169	35.4812295	0.08282684	0.49248394	0.02014707	400.2333333
44	2013-04	polarcode	1	Polarcode area	273354480	8502107	INZHENER VESHNYAKOV	RUS	FS Ice Class 1A Supe	5	General cargo ships	A31	General Cargo	A31A2GX	3	5000 - 9999 GT	1	1778.0855	90.0163031	285.351681	0.66612064	4.61762609	0.37806847	366.2619444

ASTD SIZE AGGREGATION

ASTD Aggregates ships to 7 categories:

- *<1000 GT*
- *1000-4999 GT*
- *5000-9999 GT*
- *10.000-24.999 GT*
- *25.000-49.999 GT*
- *50.000-99.999 GT*
- *>=100.000 GT*

The International Convention on Tonnage Measurement of Ships adopted by IMO in 1969, was the first successful attempt to introduce a universal tonnage measurement system. The Convention meant a transition from the traditionally used terms gross register tons (grt) and net register tons (nrt) to gross tonnage(GT) and net tonnage (NT).

Gross tonnage forms the basis for manning regulations, safety rules and registration fees. Both gross and net tonnages are used to calculate port dues.

The gross tonnage is a function of the moulded volume of all enclosed spaces of the ship.

<https://www.imo.org/en/About/Conventions/Pages/International-Convention-on-Tonnage-Measurement-of-Ships.aspx>

ASTD FUEL INFORMATION

As regulations on Sulphur content in fuel changed as of 1.1.2020, fuel information is different before and after that date. This goes for all ships in the Arctic and the information in ASTD.

[READ MORE:](#)

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

[IMO: March 2020](#)

BEFORE 1.1.2020

Fuel information can be categorized to six types of fuel

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 can be categorized to four types of fuel

0	Distillate marine fuel (MGO/MDO)
4	Liquid natural gas (LNG)
5	Battery power
6	Residual marine fuel

Flag Codes

- ASTD includes codes for the flags of ships. This is to reduce the data contained in the database.
- Users should match the code to the flag if it is unknown to them. Several sources can help to look up the flag information.
- A document with Flag Codes is available to download [here](#).

EXAMPLE

This is how flag information looks like when downloaded from ASTD

flagcode	
RUS	Russia
NIS	Malta
MTA	
FRA	Marshall Islands
VAN	
FRA	
MAI	
MTA	Sweden
SWD	
MTA	
SWD	
PAN	France
SWD	
FRA	Panama
PAN	
NIS	Norwegian International Ship Register
NIS	
FAS	
MTA	
NTH	Netherlands
BAH	
NTH	

Ice Class of ships in ASTD

- Ice class refers to a notation assigned by a classification society or a national 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 developed in co-operation by the Finnish and Swedish authorities.



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

Ship Types Aggregation

As a main rule, ships need to be registered to be eligible to navigate. Each ship is designated a ship type. ASTD utilizes the *IHS Markit StatCode 5 Shiptype Coding System* to categorize ship types. IHS has 5 category levels which are then aggregated from around 230 ship types to 15 in the ASTD System.

For example, level 5 of the IHS Fairplay information has over 10 different types of chemical tankers, including *Vegetable Oil tanker* and *Wine tanker*. This information is aggregated to *Chemical tankers* in the ASTD ship types.

However, when downloading data, users with Level I access may obtain the information in Ship Type Level 5, and therefore analyze more specific ship types. See [this document for codes for Level 5 \(Annex 14, page 7\)](#)

A document showing how the ASTD System aggregates ship types is available to [download here](#).

Ship Types Aggregation - Example

ASTD SHIP TYPES (ASTD Level 3 Users)	IHS – LEVEL 3 (ASTD Level 2 Users)	IHS – LEVEL 5 (ASTD Level 1 Users)
Bulk carriers	Bulk Dry Bulk Dry / Oil Self Discharging Bulk Dry Other Bulk Dry Other activities	Bulk Carrier
		Bulk Carrier, Laker Only
		Bulk Carrier (with Vehicle Decks)
		Ore Carrier
		Bulk/Oil Carrier (OBO)
		Ore/Oil Carrier
		Bulk Carrier, Self-discharging
		Bulk Carrier, Self-discharging, Laker
		Cement Carrier
		Wood Chips Carrier
		Urea Carrier
		Aggregates Carrier
		Limestone Carrier
		Refined Sugar Carrier
		Powder Carrier
		Bulk Cement Storage Ship

AIS

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. The information is transmitted automatically and is received by appropriately equipped shore stations, other ships, and satellites.

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.

<https://www.imo.org/en/OurWork/Safety/Pages/AIS.aspx>

AIS TRANSPONDERS

Automatic identification systems (AIS) transponders are designed to be capable of providing position, identification and other information about the ship to other ships and to coastal authorities automatically. There are two types of AIS transponders: Class A and Class B.

Class A transponders:

Class A transponders send a stronger signal than Class B transponders. Class A transponder signals may travel further and be received by a greater number of land-based stations and by satellites.

The frequency of AIS signals from Class A depends on the ships position and speed. For example, a Class A transponder on a ship traveling at a speed of 23 knots transmits an AIS signal every two seconds, while a Class A transponder on a ship traveling at a speed between 0-14 knots transmits an AIS signal every 10 seconds.

Class B transponders provide the safety and navigation benefits of Class A transponders to smaller vessels with lower cost and simpler installation. Class B transponders send fewer messages than Class A transponders.

<https://www.oceantimemarine.com/class-a-and-class-b-automatic-identification-system-ais/>

ASTD only includes signals transmitted by ships carrying AIS Class A transponders. Therefore, 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 AIS carriage requirements that voluntarily opt to carry AIS Class A transponders.

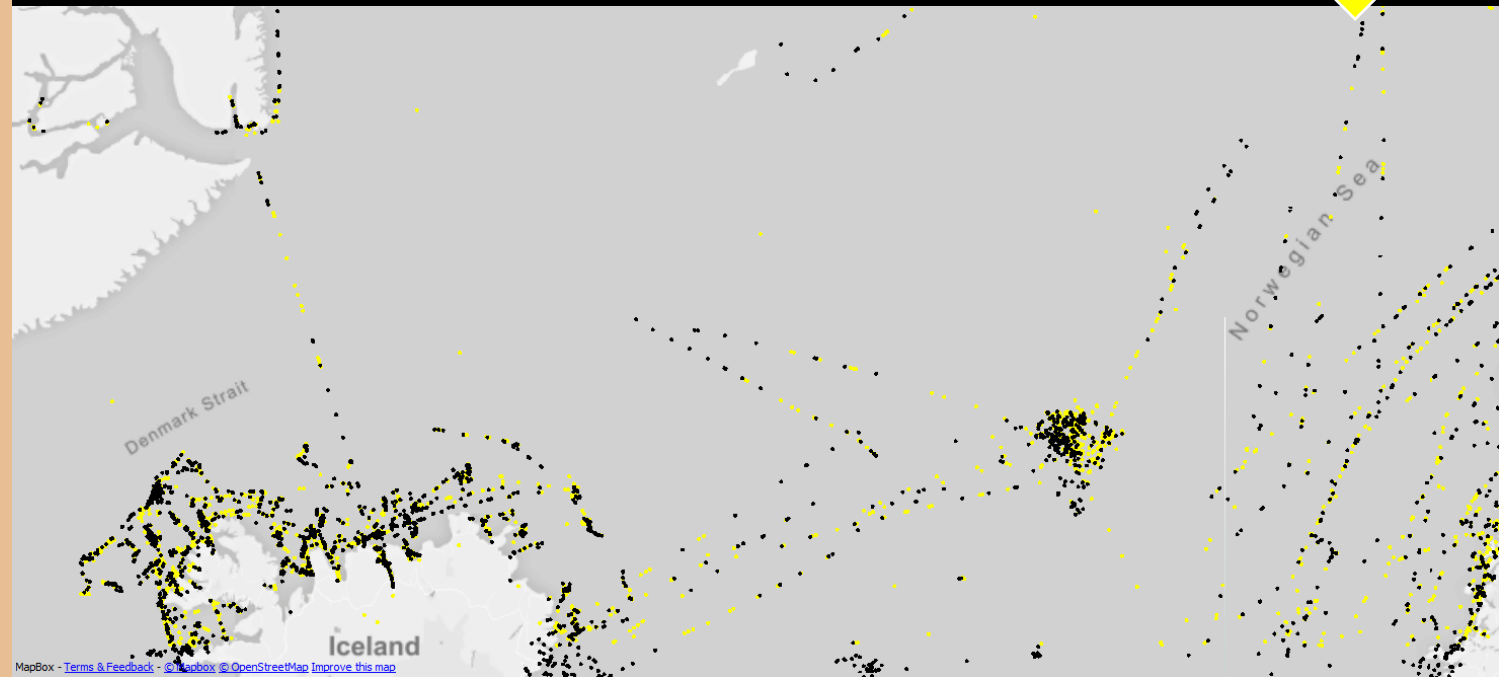
General AIS Limitations

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 data from other sources, including national collected information. Identifying smaller pleasure craft and fishing vessels can be challenging because of limitation in registries and AIS information.

Numerous factors can affect the transmission and/or receipt of AIS signals, including:

- Technical failure due to faulty infrastructure (vessel and data flow).
- Erroneous onboard installation (vessel infrastructure)
- Problems with data links/networks
- AIS signals being manipulated
- Data noise
- Challenges regarding satellite coverage

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



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 9, AIS signals are not 100% accurate, there are many variables which effect databases like ASTD. There are many other data sources like ASTD, and when comparing data between them, the information might not be 100% aligned. This could for example be differences in satellites who collect AIS signals. However, data quality in ASTD is very high.

ASTD Data Calculations

Certain data in ASTD is based on calculations using algorithms included in the database. These algorithms were prepared in a very comprehensive work by Norway, including NCA and DNV, when information from thousands of ships operating in the Arctic was collected.

The methodology is from the IMO and is updated accordingly regularly.

This includes all the information in the *Statistics* section in *Arctic area traffic in ASTD*. One example of these data calculations is statistics on fuel consumption. The calculation is prepared for each ship.



[MORE FROM THE IMO
ON CALCULATIONS OF
EMISSIONS: GUIDELINES
ON THE METHOD OF
CALCULATION OF THE
ATTAINED ENERGY
EFFICIENCY DESIGN
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SHIPS](#)

Working with Data

If data is downloaded from the FTP Server - ASTD requires GIS analysis experts to work with data from the system.

Those who have access to ASTD can download data for analysis. The data can be downloaded in different formats, but .CSV is the most common format. CSV stands for comma-separated values and is a delimited text file that uses a comma to separate values. A CSV file stores tabular data in plain text. Each line of the file is a data record. Each record consists of one or more fields, separated by commas. Each .csv file can contain millions of rows and can be very large, up to many gigabytes in size. Smaller .csv files can be opened with Microsoft Excel, but others require specialized programs to work with, like CSV Explore, Python or SQL databases like MySQL and PostgreSQL. This work requires not only a data expert, but a powerful computer as well.

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.

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 randomly pick up signals from far away, outside the Arctic area, under certain atmospheric conditions. In the prefixed reports made directly from the ASTD System, ASTD Filters out all AIS Class A transponder signals from ships with less than 10 positions in one month. This means that ships with sailing time less than one hour in a whole month are filtered out and therefore not included in the report. This has very limited effects for the reports as most of the signals are from ships outside the Arctic area covered by the ASTD System that satellites pick.

Please be aware that when downloading data from the FTP server, you need to do this cleanup yourself as you are downloading raw data. We recommend cleaning up positions of less than 10 positions each month



PAME

Protection of the Arctic Marine Environment



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