



# Arctic Shipping Data Service

## Draft Project Plan

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## Overview

The Arctic Shipping Data Service (ASDS) project is in response to increased attention and needs for a circumpolar shipping activity. It will boast a website with Arctic shipping statistics, both available for download for analyzing and figures and maps with statistics in a graphical format. In addition, a yearly report on Arctic shipping statistics will be released, using the database content.

The database provides a platform for analyzing shipping activities in the Arctic and its interactions with environmental protection measures and trends such as changing sea ice conditions, technical advancements and new regulations such as the IMO Polar Code.

The main source of shipping activity data is by access to and use of information collected by the Automatic Information System (AIS). The PAME Secretariat will conduct the technical aspects of this work in collaboration with its shipping expert group and relevant partners. ASDS will use the data to create shipping-activity based maps and graphs of trends, traffic, shipping routes and types of ships. Close collaboration and interoperability with the Arctic Biodiversity Data Base will be ensured, as well as any other relevant database.

Among the main drivers for this project is the lack of available shipping activities information for the Arctic. This information is of crucial importance for the Arctic Council, as a major international governmental forum. It will allow for analysis of shipping activities which will support decision-making of PAME and the Arctic Council in the future.

The ASDS will build on the first database of Arctic shipping activities, collected in 2005 for the Arctic Shipping Marine Assessment 2009 Report. The ASDS is therefore an initiative derived from the AMSA Report and builds on similar principles, but using more advanced technology for data collection and presentation.

## Background

PAME released the Arctic Shipping Assessment Report in 2009, a comprehensive report on numerous topics, including governance of Arctic shipping, environmental considerations and impacts, human dimensions, scenarios and futures and Arctic marine infrastructure. In addition current marine use was identified and a shipping database for the year 2005 was collected. PAME agreed that these datasets should become accessible on the PAME website.

Since no comprehensive database existed, AMSA undertook the collection of shipping data from all Arctic states. The result is the first comprehensive Arctic vessel activity database for a given calendar year. It contains a range of information on where and when different vessels are operating in the Arctic, what types of vessels, what activity they undertake and what cargo they may be carrying, among other information. The given year was 2004 and since the database was created it has not been adequately updated.

Vessel activity data for the AMSA study was collected from all Arctic states with coastal waters through the use of a specially designed questionnaire distributed to the Arctic Council's Senior Arctic Officials and PAME working group representatives in February 2006.

As technology developed, Automatic identification systems (AISs) were developed and designed to be capable of providing information about the ship to other ships and to coastal authorities automatically. Regulation 19 of the International Convention for the Safety of Life at Sea (SOLAS) Chapter V - Carriage requirements for shipborne navigational systems and equipment - sets out navigational equipment to be carried on board ships, according to ship type. In 2000, IMO adopted a new requirement (as part of a revised new chapter V) for all ships to carry automatic identification systems (AISs) capable of providing information about the ship to other ships and to coastal authorities automatically. The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size. The requirement became effective for all ships by 31 December 2004.

One of the drivers for ASDS was that the need to build on the AMSA database and continue work on a database to identify trends as shipping activities in the Arctic increase. ASDS is also supported by recommendations from the AMSA Report and a number of Records of Decisions from previous PAME meetings.

The AMSA database and other relevant initiatives, such as the SDWG Arctic Maritime and Aviation Transportation Infrastructure Initiative (AMATII) database and CAFF's ABA database have collected in a spatial format which should be made more accessible and made available to the public and research community to access and use as needed.

## **Overall/Key Objectives of the ASDS initiative**

The overall objective of the ASDS is to provide an easily accessible website with selected data on Arctic shipping, and the publication of an annual Arctic Shipping statistics Report.

### **Overall objective 1: The ASDS**

- ✓ Build on the first circumpolar shipping database (2005) as collected for the AMSA Report.
- ✓ Provide a framework to improve and expand access to a shipping activity database recognizing that there is a need to shorten the time between detection of changes, reporting and effective policy response.
- ✓ Provide data that is ready for analysis by users.

### **Overall objective 2: Outreach of ASDS**

- ✓ Provide a yearly report on Arctic shipping, focusing on statistics from the database.
- ✓ Provide high-resolution maps of Arctic shipping routes based on the AIS data. The maps are expected to be widely spread, as few maps with accurate data behind them are publicly available.
- ✓ Provide graphs and tables with relevant numbers for presentation of Arctic shipping trends, including the number of ships through the Northern Sea Route and Northeast Passage and the four types of ships shipping in the Arctic.

## Rational and follow-up with the AMSA recommendations

Since the release of AMSA, PAME has followed-up on its recommendations with numerous reports and activities. AMSA saw 17 recommendations under three themes accepted. The themes are:

- Enhancing Arctic Marine Safety (5 Recommendations)
- Protecting Arctic People and the Environment (8 Recommendations)
- Building the Arctic Marine Infrastructure (4 Recommendations)

The development of the ASDS is based on the following AMSA Recommendations:

- ✓ **Recommendation I(A) – Linking with International Organizations**  
AMSA recommended that the Arctic states would identify areas of common interest with international organizations to advance the safety of Arctic marine shipping. ASDS will seek to link up with several established institutions to facilitate data sharing of Arctic shipping, and therefore fulfill the recommendation.
- ✓ **Recommendation I(D): Strengthening Passenger Ship Safety in Arctic Waters**  
The recommendation called for support of IMO’s work, but the data collected and shared will lead to important opportunities for analysis of Arctic shipping, and lead to a better overview and understanding of trends and possible future use of the Arctic shipping lanes. ASDS will create a platform for increased safety measures for the Arctic waters.
- ✓ **Recommendation III(A): Addressing the Infrastructure Deficit**  
The ASDS will incorporate other important data work to its website. That includes a project of the *Sustainable Development Working Group* of the Arctic Council, Amatii. By analyzing shipping data, and adding to already established databases such as Amatii, better understanding of the needs of Arctic shipping will result in stronger infrastructure.
- ✓ **Recommendation III(B): Arctic Marine Traffic System**  
PAME has followed up on the recommendation to develop a comprehensive Arctic marine traffic awareness system. The development is well-in line with ASDS as countries and other stakeholders will work together to facilitate access to information.

Furthermore, the ASDS is based on a number of PAMEs **Records of Decisions (RoDs)** such as the most recent ones from PAME II-2014 i.e.:

### *AMSA II (D) – Specially Designated Arctic Marine Areas*

- ✓ Continue to seek current ship traffic data from the high seas area of the Central Arctic Ocean.

### *AMSA III(B) – Arctic Marine Traffic Systems:*

- ✓ PAME accepts the USA’s offer to prepare for PAME I-2015 a (joint) paper that sets out a template for the submission by member governments of information on ship traffic within Arctic waters subject to their jurisdiction. The template envisioned would identify specific elements (i.e. number and type of ships, ship flag, ports of call, existing ship routes, etc.) that would be requested. The

objective would be a consensus template that would guide the submission of this information on a recurring basis.

- ✓ PAME accepts Norway's offer to evaluate the extent to which it can provide to PAME/Arctic Council both raw and processed satellite AIS data for the Arctic (as defined in the Polar Code) for use, among others, in updating the AMSA report's ship traffic information.

## Key Components and Implementation

### Automatic Information System (AIS)

The International Maritime Organization's International Convention for the Safety of Life at Sea (IMO SOLAS) requires AIS to be fitted aboard international voyaging ships with gross tonnage (GT) of 300 or more, and all passenger ships regardless of size. AIS's are designed to be capable of providing information about the ship to other ships and to coastal authorities automatically.

Regulation 19 of SOLAS Chapter V - *Carriage requirements for shipborne navigational systems and equipment* - sets out navigational equipment to be carried on board ships, according to ship type. In 2000, IMO adopted a new requirement (as part of a revised new chapter V) for all ships to carry AIS capable of providing information about the ship to other ships and to coastal authorities automatically.

The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size. The requirement became effective for all ships by 31 December 2004.

Ships fitted with AIS shall maintain AIS in operation at all times except where international agreements, rules or standards provide for the protection of navigational information.

AIS was developed by the IMO technical committees as a technology to avoid collisions among large vessels at sea that are not within range of shore-based systems. The technology identifies every vessel individually, along with its specific position and movements, enabling a virtual picture to be created in real time. The AIS standards include a variety of automatic calculations based on these position reports such as Closest Point of Approach (CPA) and collision alarms.

See Annex I for more detailed AIS information.

### ASDS and interoperability with other Arctic Council initiatives

The Arctic Shipping Data Service (ASDS) will be based on similar principles as the Arctic Biodiversity Data Service (ABDS) as an online, interoperable and circumpolar Shipping data management system that will access, integrate, analyze and display Shipping information for scientists, practitioners, managers, policy makers and others.

The ASDS will provide a dynamic source for up-to-date Arctic shipping activity information and emerging trends, and serve as a focal point and common platform for all Arctic shipping-related projects of the Arctic Council.

Consolidating this data will improve access to status and trends information on ship activities and promote an opportunity to superimpose selected information to the ABDS

for deeper understanding of inter-relationships of activities and living resources trends within the circumpolar Arctic marine environment.

The **AMATII initiative** from the Sustainable Development Working Group (SDWG) of the Arctic Council assesses transportation infrastructure in the Arctic. It seeks to evaluate Northern infrastructure ports, airports, and response capability by inventorying maritime and aviation assets in the Arctic.

Cooperation with the **Arctic Spatial Data Infrastructure** initiative– Arctic SDI, has and will be explored. Arctic SDI is the cooperation between the eight National Mapping Agencies of Canada, Finland, Iceland, Norway, Russia, Sweden, USA and Denmark. The aim of the Arctic SDI is to provide politicians, governments, policy makers, scientists, private enterprises and citizens in the Arctic with access to geographically related Arctic data, digital maps and tools to facilitate monitoring and decision-making.

The aims of Arctic SDI align well with PAME's goals with ASDS and its views on its operability. Possible engagement might be the presentation of data and the making of maps and other tools for analysis.

PAME's database, ASDS, will be a welcomed addition to the flora of Arctic Council databases, enabling it to stay up-to-date with information; trends and status of relevant work in the Circumpolar Arctic. It will also enable the Arctic Council working groups to work together to learn from another to better facilitate future work of the working groups.

#### Other possible engagement – outside the Arctic Council

- ✓ Google Ocean Program (presentation of material)
- ✓ NSIDC (sea ice data)
- ✓ DNV (reports and numbers)
- ✓ WWF (numbers and maps)
- ✓ Etc.

#### Types of shipping

Not much has been done of the types of Arctic shipping defined in the AMSA report. This database will incorporate these four types of shipping, as the term Arctic shipping is very general. For example, an increase in cabotage shipping does not necessarily mean an increase in Trans-Arctic shipping, although "Arctic shipping" will have increased.

#### The four types of shipping are:

- ✓ Destinational: Ship sails to the Arctic and back south, with a clear agenda to go to a specific location and back (i.e. cruise ships stopping in Iceland or research vessels).
- ✓ Intra-Arctic transport: Activity within the Arctic (i.e between Hudson Bay in Canada and Murmansk in Russia – via the so called Arctic Bridge).
- ✓ Trans-Arctic transport: Across the Arctic Ocean between the Atlantic and the Pacific (i.e goods from Rotterdam to Japan).
- ✓ Cabotage: Within EEZ of an Arctic state (i.e. energy transport within Russian waters or coastal transportation in Iceland).

## **Main Activities/Tasks**

### **Data collection**

Collecting data from sources and receiving them on a format ready for usage. The data should be sent at specific dates.

### **Data processing (timeline):**

Data, facts and statistics collected together for reference or analysis, will play the biggest part of ASDS. The data will be presented in numerous ways, including:

- ✓ CSV files (updated regularly)
- ✓ .jpeg maps (updated yearly)
- ✓ Tables (updated yearly)
- ✓ Graphs (updated yearly)
- ✓ Reports (updated yearly)
- ✓ Connected material (updated as required)

The real value of the material will be seen after a collection has been made. It will allow for comparison between years, which will identify trends and show difference between years. Further in the future it will allow for a better picture of Arctic shipping every year that data is added to the database.

In addition to collecting the material, ASDS will preview some statistics for immediate analysis, through graphs with Arctic shipping routes, in addition to tables and graphs with information collected on selected statistics.

### **Phase 1 tasks- (Year 1 - 2015)**

- ✓ Expert group identified and assembled (shipping expert group involved)
- ✓ Expert group meeting
- ✓ Data development/technological specifications
- ✓ Data collection
- ✓ Website developments

### **Phase 2 tasks - (Year 2 - 2016)**

- ✓ Continue data aggregating
- ✓ Standardizing PAME data
- ✓ Improve database and technology
- ✓ Finalize website
- ✓ Integrate other sources
- ✓ Launch of ASDS
- ✓ Expert group meeting/s
- ✓ Next steps after project completion discussed

### **Phase 3 tasks - (Year 3 - 2017)**

- ✓ Continue data aggregating
- ✓ Finalize developments
- ✓ Expert workshop

- ✓ Maintenance
- ✓ Final report assembled and released
- ✓ Next steps identified

## Products and outreach

1. Website: Will be the “face” of the project. In addition to the ASDS material, it will include general references for Arctic shipping and access to other relevant databases, including the AMATII and ABA.
2. Database: Will include easy access to downloadable dataset, ready for immediate analysis by users. The data will be in CSV format, maps with shipping routes and other information in .jpg format, graphs and tables in .jpg formats and yearly reports with Arctic shipping statistics, derived from the project, in PDF format.
3. Workshop reports: All relevant ASDS workshops and meeting will result in a workshop report for download on the website.
4. Presentations/updates on status at the regular PAME biannual working group meetings and at SAO meetings as needed and/or requested.
5. Final report (2017): The project will deliver a final report with outcomes, shortcomings and future developments as a result of the ASDS project, within the project timeline (2014-2017 for the first phase).
6. Yearly report on Arctic shipping statistics: The project will deliver a final report with outcomes, shortcomings and future developments as a result of the ASDS project, within the project timeline (2014-2017 for the first phase).

## Project Management

Project Team: ASDS is led the PAME Secretariat, in cooperation with all PAME member states with expert inputs by the PAME shipping expert group.

The overall responsibility of the PAME Secretariat is to organize, facilitate and coordinate ASDS. It will oversee work of the expert group and distribute projects and objectives to relevant parties. It will also oversee the project budget. The Secretariat will also be responsible for the project website and its content, including outsourcing of work for relevant material.

The overall responsibility of the expert group is to identify needs and sources for the project database, and steer content of the ASDS, its scope, purpose and development.



## Estimated Budget

Consistent with the over-all Arctic Council approach, this project will be financed through both in-kind and financial contributions from member states. The PAME Secretariat will provide the necessary administrative support.

Given this is a multi-year, multi-phased project, additional budgetary details will be provided as the project evolves.

Activities	Estimated Costs (USD) (includes in-kind and financial)			
	Phase1	Phase 2	Phase 3	Total
Staff salaries and related	30.000	30.000	15.000	75.000
Communication/outreach	7.500	7.500	7.500	22.500
Consultants and other contracted services	15.000	10.000	10.000	35.000
Travel & meetings	20.000	20.000	7.500	47.500
Equipment and other capital expenditure	0	0	0	0
overheads	6.000	6.000	4.000	16.000
<b>Total</b>	<b>78.500</b>	<b>73.500</b>	<b>44.000</b>	<b>196.000</b>

## Timeline and major milestones

Timeline	Activities/Milestones
<b>2015</b>	
February	<ul style="list-style-type: none"> <li>ASDS will be discussed at the PAME shipping expert group meeting on Monday 2<sup>nd</sup> of February.</li> <li>ASDS will be introduced with a 20-minute lecture to the PAME I-2015 meeting on Tuesday the 3<sup>rd</sup> of February, under the section <i>Arctic Marine Traffic Systems</i>.</li> </ul>
February-March	<ul style="list-style-type: none"> <li>Discussions with shipping and data experts on format, organization and presentation of AIS shipping data.</li> <li>Discussions with collectors of Arctic AIS shipping data about availability, scope and sharing of the information.</li> </ul>
March	First steps to create a website for the database. Organization, set up and information identified. Creation of the overall look created.
April May	<ul style="list-style-type: none"> <li>Availability and transfer of AIS data secured via the projects partners.</li> <li>Data management developed and presentation of AIS data developed.</li> <li>Website finalized.</li> </ul>
Summer	<ul style="list-style-type: none"> <li>Data transfer to the website and database created.</li> <li>Statistics graphs and maps identified and created.</li> </ul>
September	Project discussed further at the PAME II meeting. Discussions to be decided based on status of the project before the meeting.
December	Website opened.
<b>2016</b> (Further details to be provided as the project develops)	<p>Continuation of developments. Website updates, database updates, creation of maps and graphs. Project outreach in meetings/workshops/conferences.</p> <p>Expert group meeting, in conjunction with PAME I 2016 (Winter/Spring)</p> <p>Release of the first statistical report of Arctic shipping, based on the data from the database. (Fall 2016)</p>
<b>2017</b> (Further details to be provided as the project develops)	Continuation of developments, including preparing and publishing the 1 <sup>st</sup> status report on shipping in the Arctic in conjunction with PAME I 2017 meeting (Winter/Spring)

## Annex I – AIS data

The IMO has specific [\*Guidelines for the installations of a shipborne automatic identification system \(AIS\)\*](#). The guidelines state that at the initial installation of AIS the information that should be entered at the initial installation of the AIS includes:

- ✓ Maritime Mobile Service Identity (MMSI) number
- ✓ IMO vessel number
- ✓ Radio call sign
- ✓ Name of ship
- ✓ Type of ship
- ✓ Dimension/reference for position of the electronic position fixing device (EPFD) antenna (see paragraph 5.2)

The ASDS has ambitions to include more information as available, including:

- ✓ Size (Length Overall, beam, draft)
- ✓ Gross Tonnage
- ✓ Ice Class
- ✓ Date of Build
- ✓ Power Plant Type
- ✓ Type of Fuel Burned
- ✓ Flag
- ✓ Port of departure
- ✓ Destination port

This data would allow for interesting datasets to be analyzed and one can therefore identify trends of each set. The analysis will show trends for numerous important topics for PAME and other Arctic Council working groups, in addition to other stakeholders.