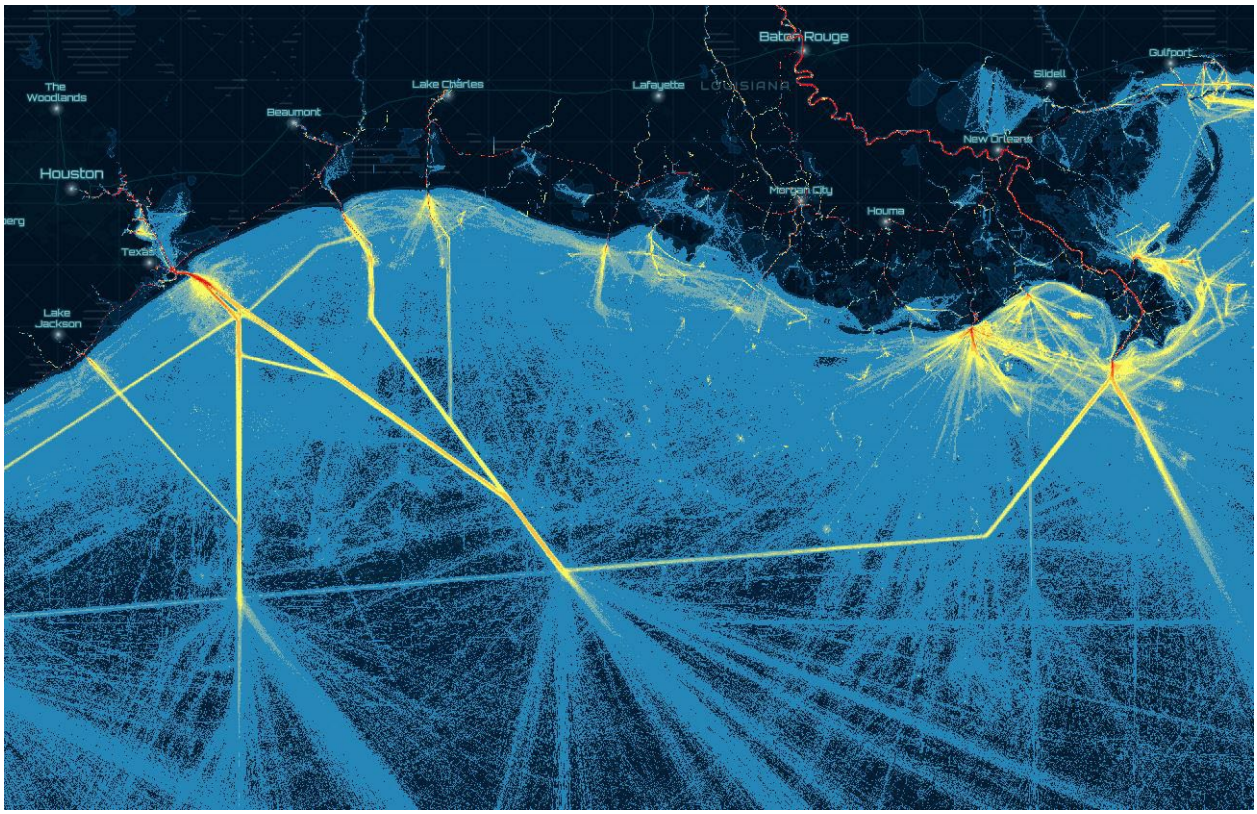
Frequently Asked Questions:
AIS Data and Tools



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MarineCadastre.gov

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Automatic Identification System (AIS) Broadcast Point Data

Data Completeness

1. **Q: Do you have plans to publish live or more recent data?**
   A: The most current AIS data we have access to is what is published on this website. We also do not have access to any live AIS data or feeds.

2. **Q: Do you have AIS data before 2009?**
   A: No, 2009 is the earliest data we have.

3. **Q: Do you have AIS for *[my location]*?**
   A: The AIS data published by MarineCadastre.gov originates from the Nationwide Automatic Identification System (NAIS) by the U.S. Coast Guard. The NAIS is composed of approximately 200 land-based receiving stations located near important navigation routes in the conterminous U.S., Alaska, Hawaii, Guam, and parts of the Caribbean. NAIS data are generally not available for the Arctic, waters beyond 40 to 50 miles of the coast, or foreign waters.

4. **Q: Do you have AIS data collected by satellite?**
   A: No. All of our data originates from land-based receivers. Commercial providers collect, license, and sell satellite AIS data. Some federal agencies purchase satellite AIS data for specific needs, and they are restricted from distributing the data to the public by the terms of their license agreement.

5. **Q: What are the formats for the AIS point data provided on MarineCadastre.gov, including spatial and temporal extent?**
   A: This table helps summarize the AIS point data provided on MarineCadastre.gov.

6. **Q: What is the best way to acquire data for an entire year(s)?**
   A: The quickest way to get a full year of data is via the annual index pages, which can be found in the AIS Broadcast Points accordion menu on our AIS page.

   Depending on how small your area of interest is, you could use AccessAIS to get data for specific time periods. Keep in mind that the download limit per order is 2 gigabytes, so your area of interest needs to be small if you want a year or more of data.

   We also have annual products for Tracks and Transits Counts, which can be found in the respective data accordions on our AIS page. These data products may be more useful if you do not require point data.

7. **Q: Why are data missing in Alaska for some years?**
   A: Data for Alaska have been available within our point data sets since 2009, but are not included in our derived data sets for tracks and transit counts. Although AIS point data may be present within Alaska, it may not cover the whole state, especially northern portions of the state and the Arctic Ocean. Better (northern) coverage can be found in years 2015, 2016, and 2017. Furthermore, the Alaska Marine Data Exchange (MXAK) owns a vast majority of the receiving stations across the state of Alaska. Therefore, beginning on 3/29/2021, AIS data within Alaska have been filtered out of our data products, at the request of MXAK.

8. **Q: Why are some files considerably smaller compared to the average size?**
   A: At this time, the U.S. Coast Guard does not provide an explanation for the variability of data coverage and data volume for their NAIS network. The MarineCadastre.gov team does process all records that we receive from the U.S. Coast Guard. As noted in our metadata, we are aware of the reduced record count

observed in late March and early April of 2018, for example. Furthermore, some individual hourly data have not been included with U.S. Coast Guard deliveries, which we make an attempt to mention within the respective year's metadata record.

9. **Q: Are accidents or other types of events removed from the AIS point data?**
   A: Collisions and accidents are not removed from the data explicitly. The MarineCadastre.gov AIS data represent 17 of the most important fields from the original AIS record. Our data are filtered to a one-minute rate and show all vessels that the land-based antennas received, with the exception of certain law enforcement, military, and other federal agency vessels that are excluded.

10. **Q: Is there any way to assess the AIS data coverage, since all data included in these data sets are from land-based receivers?**
    A: This largely depends on how you define the assessment. NAIS data are generally not available for the Arctic, waters beyond 40 to 50 miles of the coast, or foreign waters. Vessel traffic within these areas could be underrepresented by the land-based receivers. Although not an exhaustive list, our AIS point data cover many inland waterways, such as the Upper Mississippi River, Ohio River, and Missouri River. Complementary satellite data (which MarineCadastre.gov does not possess) for the same year(s) of interest could help with assessing coverage in the areas in which we provide point data.

11. **Q: Why are there AIS points over land (e.g., like Kansas and Canada in data set 2017_01_Zone14)?**
    A: Location values are principally derived from on-vessel GPS devices. For a detailed discussion on errors in GPS signals, please search the web or contact a vendor of GPS units. Accurately reported GPS positions from vessels being transported over land can also be seen in the data, as well as vessels transiting very small canals and locks that may be difficult or impossible to see on a web-map.

12. **Q: Do you include Class B data?**
    A: Beginning in 2018, we include class B data and the class designation for each record

Data Attributes

13. **Q: Is there a schema diagram or data dictionary for the AIS points data?**
    A: Please reference our data dictionary. This expands the 2015, 2016, and 2017 data with the addition of the Transceiver Class designation, beginning in 2018.
14. **Q: Are your vessel type codes cross-referenced with the U.S. Coastguard's AVIS database?**
    A: We have used the Coast Guard's Authoritative Vessel Identification Service (AVIS) database to populate and improve many of the null values found in the native AIS data. See our vessel type codes list.

15. **Q: How do I interpret the vessel codes and cargo codes?**
    A: The vessel type codes are outlined in this PDF document. The cargo codes are part of the vessel type parameter. Please see the detailed documentation available from the U.S. Coast Guard Navigation Center.

16. **Q: If I want to group data by vessel type, can I combine vessel type codes? For example, should I combine vessel type 31 (towing) with vessel type 1025 (towing vessel)?**
    A: In this example, yes.

    We have used the U.S. Coast Guard's Authoritative Vessel Identification Service (AVIS) to populate and improve many of the null values found in the native AIS data. Similar vessel types from both lists can be combined into groups. We usually categorize null values under the "other" group type. We have also found that many users have a need to define their own groups of vessel types. The vessel groups defined by MarineCadastre.gov are those frequently used among the ocean planning community.

a. Codes 0 through 255 are original vessel type codes defined by AIS standards
b. Codes 256 through 999 are an empty set added by MarineCadastre.gov
c. Codes 1001 through 1025 are keys to the AVIS vessel type descriptions

17. **Q: How do the 4-digit codes differ from what would be included in the 2-digit codes?**
A: As an example, a null Vessel Code value found within the raw National Marine Electronics Association (NMEA) data could be cross-referenced via the Maritime Mobile Service Identity (MMSI) with the AVIS database to determine the 4-digit code and vessel type attributed to the vessel within the AVIS database. The 4-digit code represents those vessel records that needed to be cross-walked with AVIS in order to identify the type of vessel that otherwise was not provided via the raw NMEA data we received from the Coast Guard.

Similar vessel types from both lists (NMEA vs. AVIS) can be combined into the same group type. We have tended to group records with null values under the Other group type. In speaking with a range of users, we have found that there are a multitude of ways that users want to group vessel records, so we tried to take a minimalist approach, knowing that our groupings would probably be modified.

18. **Q: What is represented by Vessel Type code 59, and what is RR Resolution No. 18 referencing?**
A: A good place to begin researching the meaning of type codes and resolutions is on the U.S. Coast Guard Navigation Center website (see IMO Resolutions).

19. **Q: I am trying to locate historical data for a specific vessel. How do I do this?**
A: Download the point data for your time period(s) of interest, and then extract data for specific vessels using the MMSI or International Maritime Organization (IMO) fields. Our AIS Resources document may also be of some assistance.

20. **Q: Would you be able to provide me with more details on how the MMSI codes were encrypted between 2009 and 2014?**
A: Please use this download link, which provides a script that was used to decode the MMSI values for these older AIS data. Please note that this tool is unsupported at this time.

21. **How do I determine the vessel owner?**
A: While we do not maintain vessel ownership in our AIS data, this could be acquired by joining things like the MMSI with the equivalent key field in other online database sources. Some of our VesselName attributes include the shipping company, but not all records contain such an identifier and would need to be supplemented with other data sources to derive this information.

22. **Q. Do you have a voyage identifier value?**
A: Before 2015, we did calculate and insert a voyage ID and included the destination value. Since 2015, we have not included a voyage ID or destination because defining the start and end of a voyage is a subjective and complex process dependent on mariner input. The Track Builder tools are now the best option to generate track lines that can be used to define a voyage.

23. **Q: Do you have origination or destination values?**
A: We collect the destination values; however, most of the entries are incomplete, inconsistent, or null. We will continue to monitor the destination and the origination input and will consider adding them to future products if the values are more complete.

24. **Q: How do I interpret the Course Over Ground (COG) values?**
A: The COG values are taken directly from the AIS and GPS feed originating on each vessel. Of course, there is always a risk that the raw National Marine Electronics Association (NMEA) data stream could be

modified at unknown points in time by the core receiving organizations, such as the U.S. Coast Guard's Navigation Center (NAVCEN), as a result of maintenance at their receiving base stations. Sometimes COG values may appear off due to phase wrapping, or the vessel's use of a non-north setting in its GPS software. Reference the NAVCEN documentation for more information, which provides the specifications, domains, sentinel values, and other useful guidance on the raw data.

For data beginning in 2015, COG values that are less than 0 (negative) are known to be incorrect and can be corrected by adding 409.6. Values of 360.0 refer to the COG being unavailable and can be ignored. There may be other methods for correcting COG values, for example, by recalculating from a pair of LAT, LON coordinate pairs, to get analysis-ready data. Unfortunately, we cannot provide hands-on support for providing "corrections" to fit your specific use.

25. **Q: How do I interpret the Speed Over Ground (SOG) values?**
A: The SOG values are taken directly from the AIS and GPS feed originating on each vessel. Of course, there is always a risk that the raw NMEA data stream could be modified at unknown points in time by the core receiving organizations, such as NAVCEN, as a result of maintenance at their receiving base stations. Sometimes SOG values may appear off due to the vessel's GPS software, transmitters being placed on airplanes or transport vehicles, or transmitters being associated with speed boats.

For data beginning in 2015, SOG values that are less than 0 (negative) are known to be incorrect and can be corrected by adding 102.4. Sentinel values such as 102.3 may indicate that no SOG value was transmitted, and can be translated as "not available." More information about these sentinel values and the SOG field can be referenced in the NMEA specs provided within the NAVCEN documentation.

26. **Q: How do I account for apparent inconsistencies of the AIS timestamp and of an observed vessel's voyage?**
A: The full timestamp is added to the record by the base station, using the time clock of the base station that is reporting in Coordinated Universal Time (UTC). Be sure to account for your time zone shift to UTC and other offsets such as Daylight Savings Time.

27. **Q: How do the vessel draught field from 2009 to 2014 and the vessel draft field from 2015 to present compare?**
A: The 2009-2014 draught parameter is reported in 1/10's meters, and the value 255 equals 25.5 meters or greater. Beginning in 2015, the vessel draft parameter is reported in meters. Carriage requirements and instructions to mariners for entering vessel draft values have changed over time. Recent vessel draft values report the "maximum present static draught."

28. **Q: Do you have tonnage, horsepower, fuel type, and other parameters for vessels?**
A: No, these parameters are not part of our database. We have heard about other users finding these parameters in commercial databases, and having success in merging those parameters with the MarineCadastre.gov AIS records using the MMSI value as a JOIN key.

29. **Q: What does a value of "511" in the Heading field represent?**
A: The value 511 stands for "not available = default."

30. **Q: Why are there so many type B transceiver class records, or why are some larger vessels classified as type B?**
A: For data beginning in 2018, an issue has been identified where AIS message types of 1 were incorrectly classified as type B transceiver classes, that instead should be classified as type A. Currently there is no simple method to correct this for end users.

Data Usage

31. **Q: Are the AIS data provided by MarineCadastre.gov adequate for regulatory or enforcement purposes?**
    A: The AIS data provided by MarineCadastre.gov are intended for marine planning purposes only.

32. **Q: Who owns the copyright to these AIS data, and are they available for use and redistribution by commercial entities?**
    A: Our data are derived from the U.S. Coast Guard NAIS and are free for public use. The MarineCadastre.gov AIS data are intended for coastal and ocean planning. Please see the information at the bottom of the NAIS webpage for the terms and conditions of use. If you have additional questions about the terms and conditions, please use the contact email on the NAIS data request page.

33. **Q: What is the licensing or terms and conditions for use of these AIS historical data?**
    A: Please refer to the terms of use provided by the NAVCEN website, and the copyright notice listed below.

    "As required by 17 U.S.C. 403, third parties producing copyrighted works consisting predominantly of the material produced by U.S. government agencies must provide notice with such work(s) identifying the U.S. Government material incorporated and stating that such material is not subject to copyright protection within the United States. The information on government web pages is in the public domain and not subject to copyright protection within the United States unless specifically annotated otherwise (copyright may be held elsewhere). Foreign copyrights may apply."

AIS Trackline and Transit Count Data

1. **Q: What is the resolution (cell size) of the density grids?**
   A: The cell size for the kernel density grids (2011 and 2013) is 100 meters. The cell size for the transit count grids (2015-present) is 100 meters.

2. **Q: How can I calculate the estimated time of arrival (ETA) for vessel tracks?**
   A: While there are multiple ways one could calculate ETA values, here is just one suggestion:
   a. Filter the points to remove unwanted vessels or vessel types.
   b. Generate vessel tracks, probably using a 24-hour period to segment the tracks.
   c. Generate a polygon defining the arrival port.
   d. Examine track end-time date/times of the remaining tracks.

   Note: Track start and end times are contained within the MarineCadastre.gov trackline data sets.
   Note: Track start and end times are contained within trackline products generated by the Track Builder tools.

3. **Q: Beginning in 2018, all vessels with VesselType 1001-1025 are combined into the single code 90 (or codes 90-99), whereas in previous years the distinction was made between these vessels. Is there any possibility of reverting this?**
   A: Prior to the processing of the 2018 data by the MarineCadastre.gov team, the Coast Guard made two changes that resulted in the vessel type codes you see now. For one, the Coast Guard ceased support of the AVIS database. AVIS was the source for all the VesselType code enhancements above 999. Second, the U.S. Coast Guard issued a Special Notice, "AUTOMATIC IDENTIFICATION SYSTEMS - Revised AIS Encoding Guidance for U.S. waters."

   The MarineCadastre.gov team is aware of the importance of an accurate and useful vessel type code to the coastal and ocean planning community. We have found several additional sources of vessel type codes that help classify fishing vessels that we are evaluating. Many other third-party sources exist that could be used to refine and update vessel type codes. However, most if not all that we are aware of have commercial license restrictions that would prohibit our use. Our evaluation efforts are ongoing and we hope to have a refined process in the future.

4. **Q: Why is there a small gap in coverage for the trackline data, running north and south in the Gulf of Mexico?**
   A: Our derived trackline data are processed per ocean basin and at 1-minute intervals, then merged into a national data set. This results in a gap between the Gulf of Mexico and Atlantic data, which can be seen off the west coast of Florida. Users can build their own trackline data for larger ocean areas if this small gap in coverage is an issue for secondary analysis or processing needs.

5. **Q: Why are there no trackline data for Alaska in some years?**
   A: Data for Alaska have been available within our point data sets since 2009, but are not included in our derived data sets for tracks and transit counts. Although AIS point data may be present within Alaska, it may not cover the whole state, especially northern portions of the state and the Arctic Ocean. Better (northern) coverage can be found in years 2015, 2016, and 2017. Furthermore, the Alaska Marine Data Exchange (MXAK) owns a vast majority of the receiving stations across the state of Alaska. Therefore, beginning on 3/29/2021, AIS data within Alaska have been filtered out of our data products, at the request of MXAK.

AIS Tools

1. **Q: Do any of the AIS processing tools provided on MarineCadastre.gov work with open source GIS software applications?**
   A: Our AIS Track Builder and Transit Count tools require Esri software. More information is provided within the tutorial for each tool (see "Help Documents"). Our Track Builder tool is an ArcGIS Pro (ArcPy) implementation that requires ArcGIS Pro. Esri now has its own version of our Track Builder woven into its code, called Reconstruct Tracks.

2. **Q: I am failing to create tracklines for points that are very close together. How do I create tracklines in these cases?**
   A: This is due to how the python script handles XY points that are very close together (about 10 meters or less) AND are stored in a geographic coordinate system (GCS). If the points are first transformed into a projected coordinate system, the python script runs as intended and will connect the points even when they are in very close proximity to one another.

   The TrackBuilder input file should be in a projected coordinate system if there is a need for points closer than about 10 meters to be connected. If very near points do not need to be connected, then either projected or geographic coordinate systems can be used for an input file.

3. **Q: Why do I encounter failures or errors when running the Track Builder tool (v3.1)?**
   A: Error messages that say you have run out of memory while the tool is running could be due to using the 32-bit version of the tool or environment (such as IDLE). The best solution is to use the 64-bit command line version of the program. You will need to have the 64-bit Background Geoprocessing patch installed. The patch will install a 64-bit version of Python for ArcGIS Desktop. If you are running ArcGIS Pro, be sure to use our Track Builder Pro 1.0 tool.

4. **Q: When working AIS data prior to 2015 in the file geodatabase format, clipping the broadcast features to an area of interest causes the link between the features and the voyage attributes to be broken within the Track Builder. How do I retain these voyage attributes?**
   A: The Track Builder tool looks for specific field names in the Vessel and Voyage tables that match the data model used in the MarineCadastre.gov products. Check during your CLIP process that file or field names are not being modified. Consider using a simple JOIN of the Vessel and Voyage tables using the MMSI as the key after you run the Track Builder tool.

5. **Q: I am not an ArcGIS user. How can I access and use the 2009 to 2014 data that are in the file geodatabase format?**
   A: Consider using the GDAL Python library, which supports a wide range of file format translations and other operations that can be run from the command line. Numerous commercial applications by companies such as SAFE Software and MatLab have a capacity to read the native GDB format. Reference their documentation for which version is supported.

AccessAIS

1. **Q: What type of AIS data are available within AccessAIS?**
   A: Please note that ONLY point data are available directly from AccessAIS. The annual Vessel Transit Count layers within the layers list are provided as reference only. Orders submitted will therefore not include trackline or transit count data.

2. **Q: My order says "Download has expired." What should I do?**
   A: Please keep in mind that the CSV download link will expire once it has been accessed five times or after 14 days, whichever comes first. A new order will have to be submitted at that point. We are unable to restart or regenerate the order. If you would like to generate the exact same download again, enter the same dates and AOI coordinates into AccessAIS as those provided on the order page.

3. **Q: Why is there a limit on the size of the download I can request within the AccessAIS tool?**
   A: The size limit is set in place to help improve overall user experience. To ensure that the tool runs efficiently even during times of high volumes of orders, some matter of size constraint was required. We want to allow AccessAIS to complete orders at a reasonable rate, and in a reasonable volume, for more than a single user. For larger orders, we encourage users to download data from our bulk download page.

4. **Q: If data exist back to 2009, why are there only data for the last few years within the AccessAIS tool?**
   A: The original intent of the AccessAIS tool was to include the latest five years of data that we provide. Furthermore, the data for 2015 and following years are also in a common, open source format of daily CSV files, which meets the tool's configuration requirements. The file geodatabase format of the 2009 to 2014 data would not support the design of this tool, and would have been a large undertaking to reprocess and create as CSV files.

5. **Q: Are the data found within AccessAIS coming directly from the U.S. Coast Guard? Can I get LIVE data?**
   A: No, these data are the same filtered and processed point data that you can download from our bulk download page. The tool provides a much simpler method for acquiring those AIS point data for the locations and time periods the user selects. We do not have access to any LIVE AIS data or feeds. We also do not have access to any satellite data or feeds.

6. **Are data for inland areas included in AccessAIS?**
   A: In some cases. Although not an exhaustive list, our AIS point data cover many inland waterways, such as the Upper Mississippi River, Ohio River, and Missouri River. Keep in mind that the annual Vessel Transit Counts reference layers do not include all inland waterways. To determine if point data exist within your area(s) of interest, check if the estimated size of your order is larger than 0.00 gigabytes.

7. **Q: Are data available in Alaska?**
   A: While the annual transit count layers within the AccessAIS tool do not show data in Alaska, there are typically some point data within Alaskan waters. Although AIS point data may be present within Alaska, they may not cover the whole state, especially northern portions of the state and the Arctic Ocean. Better (northern) coverage can be found in years 2015, 2016, and 2017. Furthermore, the Marine Exchange of Alaska (MXAK) owns a vast majority of the receiving stations across the state of Alaska. Therefore, beginning on 3/29/2021, AIS data within Alaska have been filtered out of our data products, at the request of MXAK.

8. **Q: Can I acquire a unique link for my area(s) of interest, to share with others?**
   A: Once your order has been submitted, an order link will be provided to the email address that was entered with the order. Once the download file has been generated, a second link will appear within the order link. That is the link unique to the CSV download.

   Please keep in mind that the CSV download link will expire once it has been accessed five times or after 14 days, whichever comes first. A new order will have to be submitted at that point. If you would like to generate the same download again, enter the same dates and area of interest coordinates into AccessAIS as those provided on the order page.

General

1. **Q: How do I formally cite MarineCadastre.gov data?**
   A: When citing a specific data layer, please use the following format:

   Bureau of Ocean Energy Management (BOEM) and National Oceanic and Atmospheric Administration (NOAA). MarineCadastre.gov. *{Enter Data Layer Name from Metadata}*. Retrieved *{Enter Month Day, Year}* from marinecadastre.gov/data.

2. **Q: Can I provide derived AIS data products on other publicly available websites?**
   A: Yes, you can submit a derived product that uses AIS data from MarineCadastre.gov. All that we ask is that you cite the data. And if possible, please let us know how you're using the data and what type of derived data set you developed. We always appreciate learning how users are applying our data and tools.

   Please also refer to the terms of use provided by the NAVCEN website, and the copyright notice listed below.

   "As required by 17 U.S.C. 403, third parties producing copyrighted works consisting predominantly of the material produced by U.S. government agencies must provide notice with such work(s) identifying the U.S. Government material incorporated and stating that such material is not subject to copyright protection within the United States. The information on government web pages is in the public domain and not subject to copyright protection within the United States unless specifically annotated otherwise (copyright may be held elsewhere). Foreign copyrights may apply."

3. **Q: Who should I list as the Point of Contact, when citing MarineCadastre.gov AIS data?**
   A: MarineCadastre.gov Data Steward
   NOAA Office for Coastal Management
   (843) 740-1202
   coastal.info@noaa.gov

4. **Q: Does MarineCadastre.gov maintain a list of coordinates for AIS receiver stations?**
   A: No. NOAA does not maintain or distribute the locations of AIS receivers, at the request of the U.S Coast Guard.

5. **Q: Have an AIS question not answered here?**
   A: Please reference the respective metadata for the data set(s) of interest, or email *MarineCadastre@noaa.gov* with your question.