

## 1. DATA AND INFORMATION TYPES

### A. Provide a contextual description of the data stream.

The Alaska Ocean Observing System (AOOS) is funding a Marine Exchange project that is adding weather stations to Automatic Identification System (AIS) receiving sites and transmitting weather data over AIS to enhance maritime safety. These weather data are also being fed through the AOOS data portal real-time.

Website URL: Real-Time Sensors, Source: Marine Exchange of Alaska

<http://portal.aos.org/#module-metadata/5da59d98-59ad-11e1-a1da-0019b9dae22b/8c5dd704-59ad-11e1-bb67-0019b9dae22b>

Website URL: Historical Sensors, Source: Marine Exchange of Alaska

<http://portal.aos.org/#module-metadata/0cbe63ce-87aa-11e3-acbf-00219bfe5678/467dd946-87aa-11e3-9eb2-00219bfe5678>

### B. How many station locations are there for this data stream?

39 (total including 5 new planned installations in 2017)

Not all of these are currently reporting real-time. Some have been discontinued or relocated, but remain in the historical sensors catalogue.

### C. What are the specific parameters of the data.

The parameters include date, time, wind speed, wind direction, wind gusts, gust direction, air temperature, relative humidity, precipitation, and pressure. These are land-based stations, and do not provide a GPS (latitude or longitude) reading in the data stream.

### D. Provide information about the sampling platform or instrumentation.

The platforms include weather stations mounted to shore-based Automated Identification System (AIS) receiver equipment used to track movements of at-sea vessels.

Instrumentation and sensors are Airmar 150WX WeatherStations. For moving applications, where true and apparent wind are different, the 150WX includes additional sensors such as a 10Hz GPS and solid-state compass. AIS weather stations are deployed on 10 foot masts, and are visited annually for maintenance (batteries, RF co-axis refits, etc).

## 2. DATA PATHWAY

### A. Is a data sharing agreement required?

Data are available publically.

### B. In which format(s) are data received by AOOS?

Data are received by web harvest from the originator website via HTML.

### C. How can the information be accessed?

The data are available through the AOOS data portal, where it can be downloaded or explored through interactive visualizations. Specifically, data are available from two unique access points:

- File Downloads (CSV)
- ERDDAP

**D. What file formats will be used for sharing data, if different from original?**

Data are shared as CSV and through ERDDAP. Data are also available for exploration in the AOOS portals via interactive, graphical visualizations.

**E. Describe how the data are ingested (e.g. the flow of data from source to AOOS data portals) and any transformations or modifications made to share data in the AOOS data portal.**

Data are downloaded from the source to the AOOS storage. Custom Java, Scala, and Python scripts are used to convert data formats suitable for internal and external interoperability services. Data are made available in the AOOS portals through the access points and via graphic displays generated through internal JSON-format data requests from these services.

Graphic displays include a mapping service, customized interactive visualizations, and time-series plots of the unit values wherein each parameter is graphed independently. Back-end scripts handle the conversion of visualized data from CF standards to other, non-CF units that may be requested by the user. Data files may be downloaded by the user from the AOOS data portal. A user request for a CSV file request pulls the data from the server cache. A user request for ERDDAP pulls data from the ERDDAP service using the same cache. For this data, no CF-standard names or units exist, therefore custom names of abundance\_of\_{scientific\_name} were used. Refer to Appendix I for CF standards.

Summary statistics generated within the interactive graphical displays may be requested by the user. Summary statistics may include minimum, maximum and mean values. Seasonal statistics, available on time series longer than 3 years, include mean, and 10th and 90th percentiles. Note: the number of points visually available to interactive users from the source data are limited when necessary using temporal binning, such as daily, weekly, monthly, seasonally and yearly.

**F. What metadata or contextual information is provided with the data?**

Data are shared in the AOOS portals with descriptive narratives describing the data and linking back to the Marine Exchange of Alaska Weather Station page:  
[http://www.mxak.org/weather\\_stations/index.html](http://www.mxak.org/weather_stations/index.html)

**G. Are there ethical restrictions to data sharing?**

No

**a. If so, how will these be resolved?**

N/A

**H. Who holds intellectual property rights (IPR) to the data?**

Marine Exchange of Alaska

**I. Describe any effect of IPR on data access.**

None

**3. DATA SOURCE AND QUALITY CONTROL**

**A. Indicate the data source type (i.e. Federal, Non-Federal, University, State Agency, Local Municipality, Military Establishment (branch), private industry, NGO, non-Profit, Citizen Science, Private individual)**

Non-Federal, non-Profit

**a. If Federal data source, were changes applied to the data?**

N/A

**b. If Yes, describe any changes to the data that require documentation?**

N/A

**B. Indicate the data reporting type (e.g. real-time, historical).**

Real-time

**C. If real-time, list the QARTOD procedures that are currently applied.**

Three of the five required QARTOD tests for weather parameters are being applied by AOOS: Syntax, Gross Range, and Time-Gap Tests.

There are five required QARTOD tests for weather parameters Wind Speed, Wind Direction and Wind Gusts, of which three are implemented by the AOOS Data System

**D. If real-time, list the QARTOD procedures that are planned for implementation.**

There are five required tests for weather parameters Wind Speed, Wind Direction and Wind Gusts outlined in the QARTOD application, of which three are already implemented by the AOOS Data System -- the syntax, gross range and time gap tests (see 3G below for full description of the AOOS procedures).

A version of the Timing Gap Test, which with QARTOD is intended to ensure ingestion of minimum hourly time series, is performed by AOOS. The AOOS version of the timing gap test changes the station color to a grey shade ("shade-flags") on the real-time sensor map display after 4 hours of missed data reports, and removes the station from the map (though not the archive) after a week of missed reports. Data remain available in the Historical Sensors catalogue.

QARTOD requires two additional tests on weathers parameters -- a location test and climatology test. Given that the AIS Weather stations are in a fixed position on land towers

and are not at risk of “breaking” mooring, the location test is not really warranted. Furthermore, this data stream does not include a GPS (latitude and longitude) location, precluding the location test for these data.

The Climatology Test is more rigorous, and currently, the AOOS Data System does not have the historical data in place to perform meaningful climatology tests on non-federal sourced weather assets. It is a test that may be considered after there are 7+ years of data in the AOOS archive.

Remaining required tests where relevant are planned for implementation within 12 months of certification.

**E. What is the status of the reported data? (e.g. raw, some QC, incomplete, delayed mode processed but not QC'd)**

Some QC by AOOS (3G).

**F. Describe the data control procedures that were applied by the originator.**

Data are converted by the instruments to engineering units using internally stored calibration and conversion algorithms. The data are constantly monitored by the Juneau and Anchorage forecast offices, but these offices do not perform QC on the AK Marine Exchange data source. These data are from a non-federal real-time data feed and are assumed to have no QC for errors prior to data ingestion by AOOS beyond the simple data conversion.

Post-processed data may be available by contacting the data provider directly.

**a. Provide a link to any documented procedures.**

N/A

**G. Describe the data control procedures that were applied by AOOS.**

AOOS currently applies three standard QC procedures to real-time and historical observation data before it is stored in the AOOS Data System. These tests include the following:

1. *Syntax Test*: Each regional data source uses unique syntax to transfer data. Some (e.g., Canada Water Office) have standardized data storage protocols and provide files whereas others (e.g., Alyeska Weather stations) are merely html web pages that are scraped for data. Therefore, each regional source requires a custom syntax test, which merely checks for parity errors by testing if data can be extracted from the downloaded or scraped data. If no data can be extracted, the test fails, and no data are accessed, served or stored for that record.

2. *Gross Range Test*: This test checks data values against minimum and maximum values defined for each parameter. In addition to parameters outlined in QARTOD manuals, AOOS includes gross range tests for parameters not covered by QARTOD (see Appendix H for the list and minimum and maximum values). Parameters include Air temperature (-130 and 130 deg F); barometric pressure (355 and 1085 mbar); wind speed and gust speed (0

and 253 mph); wind direction and gust direction (0 and 360 degrees); relative humidity (0 and 100%); precipitation (0 min only). Values outside of the prescribed parameter ranges are rejected and replaced with missing value flags in data storage connected to access points and the graphic displays.

3. *Time-Gap Check*: AOOS implements a “*time-gap check*” that informs observational assets (e.g., weather stations) displayed on its “Real-Time Sensor Map”. If no data are received from an existing observational station for four hours, the icon on the map changes from a scaled color to a small grey-shade dot. If no data are received from an existing observational station for one week, the asset is automatically removed from the map, although assets are still made available on a historical sensor map.

AOOS QC syntax and gross range tests qualify as legitimate QC checks for many data stream parameters described by US IOOS Quality Assurance of Real-Time Oceanographic Data (QARTOD) protocols. The AOOS version of the “*time-gap check*” does not flag data or gaps in the underlying AOOS data storage, thus may not completely satisfy the “time-gap test” proposed by QARTOD.

**a. Provide a link to any documented procedures.**

AOOS Data Assembly Center and Data Management Plan (2016).

**H. List the procedures taken for data that could not be QC'd as directed.**

N/A

**4. STEWARDSHIP AND PRESERVATION POLICIES**

**A. Who is responsible for long-term data archiving?**

Data are aggregated for visualization and exploration with other layers in the AOOS data portal. AOOS stores the real-time and historical data internally using the AOOS data servers.

AOOS will facilitate data archival with NCEI. This data stream is of interest to NCEI, and once proper metadata requirements are verified, data will be archived there.

To facilitate archival of the valuable assets not of interest to NCEI, AOOS plans to also archive data in the DataONE network. More information about DataONE can be found in the Data Management Plan (section 4.4.7) and at <https://www.dataone.org/>

**B. Which long-term data storage facility will be used for preservation?**

N/A

**C. Describe any transformation necessary for data preservation.**

N/A

**D. List the metadata or other documentation that will be archived with the data.**

N/A