

NDBC Web Data Guide



NDBC Web Data Guide

National Data Buoy Center (NDBC)

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1. General Guidance

This document provides a high-level overview of data available on the NDBC web site (<https://www.ndbc.noaa.gov/>) to support data consumers. The goal is to assist the user in determining the best option for obtaining their required data while minimizing the potential load on the NDBC web site. We recommend that you review the entire content of this document prior to deciding on your implementation strategy, because NDBC supports numerous methods to obtain data from our web site. We highly discourage you from developing unique processes (i.e. screen scrape mobile page) to obtain our data via other methods since future development may have a negative impact on your process. We also ask that you consider the frequency of the data updates and limit your data request to conserve our bandwidth and ability to support other users. If after reviewing this document you still have concerns in regards to the best method please contact us via the web master e-mail webmaster.ndbc@noaa.gov and we can provide additional guidance.

NDBC currently has FTP services that are available; however, our future plans are to discontinue these services, therefore, we will not address them in this document. We strongly recommend that you avoid the use of FTP services when using the NDBC web site.

The majority of data posted to the NDBC web server are stored in ascii files that may be downloaded via HTTP, wget, or Perl/LWP (among other utilities). **HTTPS is the preferred protocol.**

2. Realtime Data

The **Realtime** directory <https://www.ndbc.noaa.gov/data/realtime2/> contains the current (last 45 days) data. The term Realtime refers to the version of the data. In general, Realtime data are the data that have undergone automated quality control checks as they were received in real time and released on the Global Telecommunications System (GTS). The files are named *station_id.datatype*.

See appendix A for a listing of the data type extensions and the associated data.

As an example, the following files would apply to station 41002,

- the standard meteorological data is in 41002.txt
- the continuous winds data is in 41002.cwind
- the spectral wave summary data is in 41002.spec
- the raw spectral wave data is in 41002.data_spec
- etc.

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In building file names all alphabetic characters must be in upper case. For instance the C-MAN (land) station FPSN7 – Frying Pan Shoals, NC must be entered in uppercase, e.g., FPSN7.txt.

Not all of these data types are available for each station; however, each station has at least one data type.

See [Measurement Descriptions and Units](#) for more information on the units of measure used on the NDBC web site and sample file types.

You can also navigate to this data by selecting a station page and then scrolling down to the bottom and selecting the “Real Time Data” link.

3. Latest Observations File

The latest observation file is available at:

https://www.ndbc.noaa.gov/data/latest_obs/latest_obs.txt

This file contains essentially the same data elements as the standard meteorological data file, however, instead of having the observations from a single station; this file has the most recent observation (provided that the observation is less than two hours old) from all stations hosted on the NDBC web site. Since this file has multiple stations it also contains the position information (latitude and longitude) for each station. The file is relatively small, less than 100KB, and is updated approximately every 5 minutes, so it would be a good source of data if you are interested in meteorological observations from multiple stations.

4. Historical Data & Climatic Summaries

The historical files are available at:

https://www.ndbc.noaa.gov/station_history.php?station=42040

Where the 42040 represents the station that you are interested in.

You can also navigate to this page by selecting a station page and then scrolling down to the bottom and selecting the “Historical Data & Climatic Summaries” link.

The returned page will have four main sections:

- Quality Controlled data for the current year – by months
- Historical Data – by calendar year
- Search historical meteorological data for observations that meet your threshold conditions

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- Climatic summary table and plots – by parameter. For details about this information please review the description available at:
<https://www.ndbc.noaa.gov/climatedesc.shtml>

5. Active Station List

The Active Station List is available at <https://www.ndbc.noaa.gov/activestations.xml>

This file provides **metadata in regards to the current deployment** for all active stations on the NDBC web site. The metadata includes station ID, latitude, longitude, station name, station owner, program to which the station belongs, and type of data reported as detailed below:

- met: indicates whether the station has reported meteorological data in the past eight hours (y/n).
- currents: indicates whether the station has reported water current data in the past eight hours (y/n).
- waterquality: indicates whether the station has reported ocean chemistry data in the past eight hours (y/n).
- dart: indicates whether the station has reported water column height/tsunami data in the past 24 hours (y/n).

This file is refreshed every five minutes as needed. Note: The main activity that drives changes are: a service visit, establishment of a new station, or changes in the type of data received (i.e. sensor/station failure) therefore, minimal updates would be expected in a 24 hour period.

Note, the TAO entries do not include the data type attributes (met, currents, water quality and dart) but do include a seq attribute for syncing access to the TAO web site. The TAO array is the climate stations in the equatorial Pacific.

6. Metadata in XML

The metadata in XML is available at:

<https://www.ndbc.noaa.gov/metadata/stationmetadata.xml>

The supporting XML schema can be found at:

<https://www.ndbc.noaa.gov/metadata/stationmetadata.xsd>

This file contains the **historical metadata back to 2000** for all stations on the NDBC website. Limited metadata is available for non-NDBC stations. The file is generated once

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daily at midnight U.S. Central Time (05:00 UTC during daylight saving time or 06:00 UTC during standard time).

Note: this file is fairly new and there were some inconsistencies in our older metadata, so this file is not 100% accurate, however, it is the best representation of the station history from our perspective.

7. NDBC Data Directory

The most important files from this directory have already been covered in depth in previous sections; however, this section gives you a broad overview of all the files available under the data directory available at: <https://www.ndbc.noaa.gov/data/>

See Appendix B for a listing of the subdirectories under the Data directory.

8. DODS Services

The NDBC Distributed Oceanographic Data System (DODS) makes netCDF files available to the science community and general public via our website. It uses the Open Source Project for a Network Data Access Protocol (OPeNDAP) software for data providers to share data with each other and the end users. This service is available at the following URL: <https://dods.ndbc.noaa.gov/>

The following provides a high level overview of the directory structure/data types available via the NDBC DODS server:

- All NDBC Data
 - NDBC Data
 - adcp – Acoustic Doppler Current Profiler Data contains depth, direction and speed
 - adcp2 –Acoustic Doppler Current Profiler Data with additional QC information primarily from Gulf of Mexico oil rigs.
 - cwind – Continuous Winds data
 - dart – Deep-ocean Assessment and Reporting of Tsunamis data
 - mbcurr – Marsh-McBirney Current Measurements data
 - ocean – Oceanographic data
 - pwind – Peak Winds data
 - stdmet – Standard Meteorological data
 - swden – Spectral Wave Density data with Spectral Wave Direction data
 - wlevel – Water Level data (tide) measured from a non-DART NDBC station
 - NDBC TAO Buoy Data – Click the NDBC TAO Buoy Data hyperlink. The subdirectories are named for each station, based on the latitude and longitude. For

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example the station at equator and 110W is named T0N110W, the station at 2N 110W is named T2N110W. The “T” in the first position of the file name designates that it is a TAO site.

- OceanSITES Data – Click the OceanSITES hyperlink . Provides access to OceanSITES data, including TAO. Note the TAO data is the same data as available under the ‘NDBC TAO Data’ directory above.
- NDBC TAO CTD Data – contains the TAO CTD data collected on servicing cruises organized by cruise id. The cruise id consist of a two letter ship id, a two digit fiscal year, and a sequence number for each cruise performed in support of TAO for that year.
- NDBC HF Radar Data – Click the NDBC HF Radar Data hyperlink. Provides gridded data organized by region and resolution. These data are aggregated over a four day period. You may also access individual hourly HF radar data files by clicking the hyperlink.

9. Tropical Atmosphere Ocean (TAO) Data Download Page

The TAO Data Download is available at:

https://tao.ndbc.noaa.gov/tao/data_download/search_map.shtml

This data download page provides numerous options for the end user to select: stations, data types, start dates, end dates, temporal resolution, file format, etc. This download process is limited to only TAO data from the equatorial Pacific; you cannot get other data hosted on the NDBC web site via this process.

10. High Frequency (HF) Radar Data Access

NDBC HF Radar Data –Provides gridded data organized by region and resolution. These data are aggregated over a four day period. The data is available at:

<https://dods.ndbc.noaa.gov/thredds/hfradar.html>

You may also access individual hourly HF radar data files. The data is available at:

<https://dods.ndbc.noaa.gov/thredds/catalog/hfradar/catalog.html>

In addition to the DODS server HF radar data is available from the main HF radar page at: <https://hfradar.ndbc.noaa.gov/>. If you scroll down to the bottom of the page the last hyperlink “Tabular Format” will provide observation data in a tab delimited file for the current area displayed on the map. If you scroll to the bottom of the second page there is a link to “Download results as text.”

11. DART Data Access

You can retrieve and display a plain text listing of NDBC's historical DART data that matches the station ID, starting date, and ending date that you specify. Specify these by modifying the arguments in this URL -

https://www.ndbc.noaa.gov/dart_data.php?station=43412&startmonth=&startday=&startyear=&endmonth=&endday=&endyear=.

The arguments for the station ID and starting and ending dates are specified as follows:

- station= station ID;
- startmonth = starting month (numeric, 1-12);
- startday = starting day (numeric, 1-31);
- startyear = starting year (numeric);
- endmonth = ending month (numeric, 1-12);
- endday = ending day (numeric, 1-31); and
- endyear = ending year (numeric).

These arguments may be entered in any order, but all must be given valid values.

For example; to retrieve data from station 43412 for January 4, 2004 through January 10, 2004; use the following URL:

https://www.ndbc.noaa.gov/dart_data.php?station=43412&startmonth=6&startday=01&startyear=2023&endmonth=6&endday=6&endyear=2023

This will return all water column heights on the NDBC web site for station 43412 from 00:00:00 UTC on June 01, 2023 through 00:00:00 UTC on June 6, 2023 inclusive. The output will display the parameters followed by the data. The data includes:

- *date/time of the observation* - formatted as "YYYY MM DD hh mm ss" or "2023 06 05 01 30 00" for 01:30:00 UTC on June 5, 2023.
- *measurement Type* - 1 = 15 minute measurement; 2 = 1 minute measurement; 3 = 15 second measurement.
- *water column HEIGHT* - The data are recorded in pounds per square inch absolute (PSIA), but are displayed in meters of water after applying a constant 670.0 mm of water/PSIA conversion factor.

A sample format follows (only part of the file is displayed):

```
station 43412
startyear 2023
startmonth 06
startday 5
endyear 2023
endmonth 06
```


endday 6

```
YYYY MM DD hh mm ss T HEIGHT (meters)
2023 06 06 00 00 00 1 3020.818
2023 06 05 23 45 00 1 3020.786
2023 06 05 23 30 00 1 3020.760
2023 06 05 23 15 00 1 3020.736
2023 06 05 23 00 00 1 3020.712
2023 06 05 22 45 00 1 3020.695
2023 06 05 22 30 00 1 3020.678
2023 06 05 22 15 00 1 3020.673
2023 06 05 22 00 00 1 3020.662
```

12. Observation Widget

If you host a web page and are interested in providing the most recent observation from a limited number of NDBC hosted stations, NDBC provides an Observation Widget that allows you to easily integrate NDBC observations into your web page.

Additional Information is available at: <https://www.ndbc.noaa.gov/widgets/>

Note: This technique only works for web pages in which the user has the ability to paste HTML content.

13. BuoyCAM Images

NDBC operates BuoyCAMs at several stations. These BuoyCAMs typically take photos only during daylight hours.

To view the most recent BuoyCAM image from an NDBC station, use this URL:

<http://www.ndbc.noaa.gov/buoycam.php?station=xxxxx>

where xxxxx is the desired station ID. To see which stations are currently reporting BuoyCAM images, check the [BuoyCAMs map](#).

If the server encounters any difficulties in processing your request, you will receive one of these error messages:

- *No station specified*

Modify your URL to use the station parameter to specify a valid station with a BuoyCAM (station=xxxxx where xxxxx is the station ID). Look at the [BuoyCAMs map](#) to see which stations have a BuoyCAM.

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- *Invalid station specified*
The station on the URL is not a valid station. Review the [BuoyCAMs map](#) to see which stations have a BuoyCAM.
- *This station has no BuoyCAM*
The station on the URL is valid but has no BuoyCAM installed. Look at the [BuoyCAMs map](#) to see which stations have a BuoyCAM.
- *BuoyCAM photo for this station is older than 16 hours*
The BuoyCAM on the specified station has not reported in the past 16 hours, hence there is no image to display.
- *Unable to access BuoyCAMs at this time*
There is an issue preventing the BuoyCAM process from functioning properly. Recommend waiting at least 30 minutes and trying again, if the problem persists contact the NDBC webmaster with the URL used and the date/time the error was received.

14. Observations by Latitude/Longitude

Under the OBSERVATIONS drop down menu select Observation Search. This option will allow you to perform a Radial Search or a Box Search. The Radial Search will return all observations within a user specified distance from a user specified latitude and longitude. The Box search will return all observations within a user defined box, based on the latitudes and longitudes entered by the user. This feature is available at the following URL: <https://www.ndbc.noaa.gov/os.shtml>

Currently this option only provides the response to the screen and is not available for downloading.

15. Ship Observations

Under the OBSERVATIONS drop down menu select Ship Obs Report, this option will allow you to see all ship observations for the current hour back through the last twelve hours. This feature is available at the following URL: https://www.ndbc.noaa.gov/ship_obs.php

16. Historical Station – User Defined Conditional Search

Under the OBSERVATIONS drop down menu select Historical Observation Search, this option allows the user to select a station and then perform a historical (past years) search for a user defined condition. The search is limited to a specific station and a specific year, but the condition is user defined based on the parameters measured at the station. For instance a

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user could determine when in 2022 station 46047 experienced wave heights greater than 5 meters. The response is shown below:

An event is defined as more than three hours of consecutive data records that match the criteria.

Total Events: 0 [Summary](#)

Observations:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Records	743	670	742	719	738	719	741	700	703	744	747	1484	9450
Records Matching Search Criteria	2	0	0	1	3	0	0	0	0	0	0	1	7
Percent of Records Matching Search Criteria	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[View text file of all obs that meet your search criteria](#)

This feature is available at the following URL: <https://www.ndbc.noaa.gov/histsearch.php>

17. Feedback

If after reviewing this document you have any comments or suggestions to improve this document please contact us via the web master e-mail webmaster.ndbc@noaa.gov and use the subject “NDBC Web Data Guide.”

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Appendix A – File Extension Mapping to Data Types

File Extension	Data Type
adcp	Acoustic Doppler Current Profiler
cwind	continuous winds data (10 minute average)
dart	water column height
data_spec	raw spectral wave data
drift	meteorological data from drifting buoys and limited moored buoy data mainly from international partners
ocean	oceanographic data
rain	hourly rain data
spec	spectral wave summaries
srad	solar radiation data
supl	supplemental measurements data
swdir	spectral wave data (alpha1)
Swdir2	spectral wave data (alpha2)
Swr1	spectral wave data (r1)
Swr2	spectral wave data (r2)
tide	tide data
txt	standard meteorological data

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Appendix B – Subdirectories of www.ndbc.noaa.gov/data

Directory Name	Contents
5day2	Observations for the last 5 days from all active stations. The file extensions are the same as shown in Appendix A.
DAB Forecast	The NWS forecast for the region that includes station. Supports the Dial A Buoy application.
Forecasts	The NWS forecast for the region that includes station. Supports the web site. Recommend the NWS Point Forecast.
adcp	Acoustic Doppler Current Profile by station for the current calendar year by month with only high level range checks applied.
adcp2	Acoustic Doppler Current Profile by station for the current calendar year by month with full RDI quality checks applied. Only available if NDBC receives RDI raw messages.
climatic	Climatic Summaries for each station. Dates vary by station; however, none has been updated since 2013
cwind	Continuous Winds by station for the current calendar year by month.
dart	Water level height by station for the current calendar year by month.
derived2	Derived meteorological data (i.e. chill, heat, icing, 10 and 20 meter wind speeds) by station for the past 45 days.
drift	Data for non-moored platforms by station for the current calendar year by month
historical	Provides historical data (previous calendar years) for all directory types listed in this table.
hourly2	Provides ADCP, continuous winds, oceanographic data, spectral wave summary, solar radiation, supplemental measurements, and standard meteorological measurements for hours 0-23 (UTC) for the current date. Note: directories for hours not reached will contain observation data for the previous day. Each file contains observations from all stations.
l adcp	Provides non-BOEM (oil rig) ADCP data by station for the prior month. Updates around mid month for the previous month.
l adcp2	Provides BOEM (oil rig) ADCP data by station for the prior month. Updates around mid month for the previous month.
l cwind	Provides continuous wind data by station for the prior month. Updates around mid month for the previous month.
l dart	Provides water height data by station for the prior month. Updates around mid month for the previous month.
l drift	Data for non-moored platforms by station for the previous month. Updates around mid month for the previous month.

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Directory Name	Contents
l ocean	Provides ocean data by station for the prior month. Updates around mid month for the previous month.
l srad	Provides solar radiation data by station for the prior month. Updates around mid month for the previous month.
l stdmet	Provides standard meteorological data by station for the prior month. Updates around mid month for the previous month.
l supl	Provides supplemental data by station for the prior month. Updates around mid month for the previous month.
l swden	Provides spectral wave density by station for the prior month. Updates around mid month for the previous month.
l swdir	Provides spectral wave data (alpha1) by station for the prior month. Updates around mid month for the previous month.
l swdir2	Provides spectral wave data (alpha2) by station for the prior month. Updates around mid month for the previous month.
l swr1	Provides spectral wave data (r1) by station for the prior month. Updates around mid month for the previous month.
l swr2	Provides spectral wave data (r2) by station for the prior month. Updates around mid month for the previous month.
l wlevel	Provides water level (tide) by station for the prior month. Excludes DART/Tsunami stations. Updates around mid month for the previous month.
latest obs	See section 3 of this document. This is a good source of latest meteorological observation for multiple stations. In addition, there are files for each station with the latest observation in both a text and an RSS format.
ocean	Ocean data by station for the current calendar year by month.
oceansites	OceanSites data
rain	Hourly rain data by station for the current calendar year by month.
rain10	10 minute rain data by station for the current calendar year by month.
rain24	Daily rain data by station for the current calendar year by month.
realtime2	See section 2 of this document. This is a good source of observation data for the last 45 days
sar2	Search and rescue support data by station
special	Special report on Station 42040 during Hurricane Ivan in 2004
srad	Solar radiation data by station for the current calendar year by month.
stations	Contains several files that provide metadata on buoy and CMAN site and sensor elevation and station owner and limited metadata. The files are updated daily.

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Directory Name	Contents
stdmet	Standard meteorological data by station for the current calendar year by month.
supl	Supplemental data by station for the current calendar year by month.
swden	Spectral wave density data by station for the current calendar year by month.
swdir	Spectral wave data (alpha1) by station for the current calendar year by month.
swdir2	Spectral wave data (alpha2) by station for the current calendar year by month.
swr1	Spectral wave data (r1) by station for the current calendar year by month.
swr2	Spectral wave data (r2) by station for the current calendar year by month.
wlevel	Water level (tide) data by station for the current calendar year by month. Excludes DART/Tsunami stations.