



# **NDBC Web Data Guide**

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# NDBC Web Data Guide

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## Table of Contents

1. General Guidance.....	1
2. Realtime Data.....	1
3. Latest Observations File.....	2
4. Historical Data & Climatic Summaries.....	2
5. Active Station List .....	3
6. Metadata in XML.....	3
7. NDBC Data Directory.....	4
8. DIF/SOS Services .....	4
9. DODS Services .....	5
10. Tropical Atmosphere Ocean (TAO) Data Download Page.....	6
11. High Frequency (HF) Radar Data Access.....	6
12. DART Data Access .....	6
13. Observation Widget .....	7
14. BuoyCAM Images .....	8
15. Observations by Latitude/Longitude.....	9
16. Ship Observations .....	9
17. Historical Station – User Defined Conditional Search .....	9
18. Feedback .....	9
Appendix A – File Extension Mapping to Data Types.....	A-1
Appendix B – Subdirectories of <a href="http://www.ndbc.noaa.gov/data">www.ndbc.noaa.gov/data</a> .....	B-1

## 1. General Guidance

This document provides a high level over view of data available on the NDBC web site (<http://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 farm. 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](mailto: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). **HTTP is the preferred protocol.**

## 2. Realtime Data

The **Realtime** directory <http://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.

# NDBC Web Data Guide

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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. Samples of each file type are available at the following URL:  
<http://www.ndbc.noaa.gov/mods.shtml>

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:

[http://www.ndbc.noaa.gov/data/latest\\_obs/latest\\_obs.txt](http://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:

[http://www.ndbc.noaa.gov/station\\_history.php?station=42040](http://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
- Climatic summary table and plots – by parameter. For details about this information please review the description available at:  
<http://www.ndbc.noaa.gov/climatedesc.shtml>

### 5. Active Station List

The Active Station List is available at <http://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:

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

The supporting XML schema can be found at:

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

# NDBC Web Data Guide

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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 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: <http://www.ndbc.noaa.gov/data/>

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

## 8. DIF/SOS Services

The NDBC Sensor Observation Service (SOS) is an implementation of the Open Geospatial Consortium (OGC) SOS 1.0 specification that supports the Core Operations Profile. An overview is available at: <http://sdf.ndbc.noaa.gov/sos/>. An interactive demonstration is available at: <http://sdf.ndbc.noaa.gov/>. The actual service is available at: <http://sdf.ndbc.noaa.gov/sos/server.php>. This service provides an API for accessing observation data for the following measurements:

- Air Temperature
- Conductivity
- Currents
- Salinity
- Sea Level Pressure
- Water Level
- Water Temperature
- Waves
- Winds

These data may be returned in the following formats:

- comma-separated values (CSV)
- tab-separated values (TSV)
- KML/JSON (experimental)
- OGC Sensor Web Enablement (SWE) 1.0 using the IOOS template

NDBC also supports a GML response, but its use is discouraged as it will be discontinued in a future update. SOS is intended to support machine to machine interface, without human

intervention. One of the limitations of the current NDBC implementation is that you can only request one data type per request. However, you can make multiple calls to obtain all observations. This lack of multiple observed properties and higher complexity queries are a limitation to its current use. However, if you are interested in a single or limited data types (i.e. water level/Tsunami) then SOS maybe a good fit.

### 9. 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:

<http://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
    - eval – **DO NOT USE - Unofficial data**
    - mbcurr – Marsh-McBirney Current Measurements data
    - ocean – Oceanographic data
    - oceansites – **see OceanSITES Data directory below.**
    - pwind – Peak Winds data
    - stdmet – Standard Meteorological data
    - swden – Spectral Wave Density data with Spectral Wave Direction data
    - tao-adcp - **see “NDBC TAO Data” directory below.**
    - tao-ctd - **see “NDBC TAO Data” directory below.**
    - wlevel – Water Level data (tide) measured from a non-DART NDBC station
  - NDBC TAO Buoy Data – The subdirectories are named for each station, based on the latitude and longitude. For 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.
  - 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.

- OceanSITES Data – provides access to OceanSITES data, including TAO. Note the TAO data is the same data as available under the ‘NDBC TAO Data’ directory above.

### 10. Tropical Atmosphere Ocean (TAO) Data Download Page

NDBC recently modified the TAO Data Download page to make it more user friendly. The new TAO Data Download is available at:

[http://tao.ndbc.noaa.gov/tao/data\\_download/search\\_map.shtml](http://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.

### 11. High Frequency (HF) Radar Data Access

NDBC has the most recent 72 hours of HF radar data available via DODS/THREDDS. This service is available at: <http://sdf.ndbc.noaa.gov/thredds/catalog.html>

In addition to the DODS server HF radar data is available from the main HF radar page at: <http://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.”

### 12. 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 -

[http://www.ndbc.noaa.gov/dart\\_data.php?station=46401&startmonth=&startday=&startyear=&endmonth=&endday=&endyear=](http://www.ndbc.noaa.gov/dart_data.php?station=46401&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);



## NDBC Web Data Guide

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- 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 46401 for January 4, 2004 through January 10, 2004; use the following URL:

[http://www.ndbc.noaa.gov/dart\\_data.php?station=46401&startmonth=1&startday=4&startyear=2004&endmonth=1&endday=10&endyear=2004](http://www.ndbc.noaa.gov/dart_data.php?station=46401&startmonth=1&startday=4&startyear=2004&endmonth=1&endday=10&endyear=2004)

This will return all water column heights on the NDBC web site for station 46401 from 00:00:00 UTC on January 4, 2004 through 23:59:59 UTC on January 10, 2004, 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 "2004 01 04 01 30 00" for 01:30:00 UTC on January 4, 2004.
- *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:

station 46401  
startyear 2004  
startmonth 01  
startday 18  
endyear 2004  
endmonth 01  
endday 22

YYYY MM DD hh mm ss T HEIGHT (meters)  
2004 01 22 15 00 00 1 5526.870  
2004 01 22 14 45 00 1 5526.883  
2004 01 22 14 30 00 1 5526.896  
2004 01 22 14 15 00 1 5526.907  
2004 01 22 14 00 00 1 5526.915  
2004 01 22 13 45 00 1 5526.917  
2004 01 22 13 30 00 1 5526.914

### 13. 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: <http://www.ndbc.noaa.gov/widgets/>

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

### 14. 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.
- *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.

### 15. Observations by Latitude/Longitude

On the left navigation bar, there is an option labeled as Obs 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:

<http://www.ndbc.noaa.gov/os.shtml>

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

### 16. Ship Observations

On the left navigation bar, there is an option labeled as 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: [http://www.ndbc.noaa.gov/ship\\_obs.php](http://www.ndbc.noaa.gov/ship_obs.php)

### 17. Historical Station – User Defined Conditional Search

This feature 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 user could determine when in 2013 station 46047 experienced wave heights greater than 5 meters. This feature is available at the following URL:

<http://www.ndbc.noaa.gov/histsearch.php>

### 18. 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](mailto:webmaster.ndbc@noaa.gov) and use the subject “NDBC Web Data Guide.”

# NDBC Web Data Guide

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## Appendix A – File Extension Mapping to Data Types

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

## NDBC Web Data Guide

### Appendix B – Subdirectories of [www.ndbc.noaa.gov/data](http://www.ndbc.noaa.gov/data)

Directory Name	Contents	Recommended Use
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.	Do Not Use
Forecasts	The NWS forecast for the region that includes station. Supports the web site. Recommend the NWS Point Forecast.	Do Not Use
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.	
adcp raw data	Acoustic Doppler Current Profile, raw binary files by year by station.	
climatic	Climatic Summaries for each station. Dates vary by station; however, none has been updated since 2009.	
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.	
dart deployment history	2009 data for station 43412 and 43413	Do Not Use
dart deployment realtime	Water level height by station each file may contain multiple years	
derived2	Derived meteorological data (i.e. chill, heat, icing, 10 and 20 meter wind speeds) by station for the past 45 days.	
glider	Contains 3 subdirectories active, historical, dives. Active – contain the GTS formatted KKYY message for active stations. Historical – provides the historical GTS formatted KKYY message by station id. Dives – provides the kmz file for active gliders.	
gzip	Provides GZIP software.	Do Not Use
historical	Provides historical data (previous calendar years) for all directory types listed in this table.	

## NDBC Web Data Guide

Directory Name	Contents	Recommended Use
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 mbcur	No content is available	
l ocean	Provides ocean data by station for the prior month. Updates around mid month for the previous month.	
l srاد	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.	

## NDBC Web Data Guide

Directory Name	Contents	Recommended Use
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.  In addition there are files for each station with the latest observation in both a text and an RSS format.	Good source of latest meteorological observation for multiple stations
mbcurr	No content is available	
ocean	Ocean data by station for the current calendar year by month.	
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	Good source of observation data for the last 45 days
sar2	Search and rescue support data by station	
seakeepers		Do Not Use
ship_obs	Old ship observations – no longer used	Do Not Use
special	Special report on Station 42040 during Hurricane Ivan in 2004	Do Not Use
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.	Metadata
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.	

## NDBC Web Data Guide

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Directory Name	Contents	Recommended Use
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.	