

Instrumentation Services Supplemental Atmospheric Data Tutorial

By: Andrew Adinolfi and Andy Frassetto, April 9, 2012

The Incorporated Research Institutions for Seismology Data Management Center maintains a suite of commands that rapidly access data archived from any open station. This suite is referred to as IRIS DMC Web Services (<http://www.iris.edu/ws/>), which uses http protocol accessible by URL. The URL can be used by command line application or in a web browser. These services are predominantly subscribed by seismologists but are available to investigators in any discipline.

In the process of upgrading stations used by the Global Seismic Network and EarthScope's USArray Transportable Array (TA), IRIS has added multiple atmospheric instruments. Currently all 453 TA stations are equipped with the Quanterra Q330 environmental processor, which measures both temperature and pressure data from within the station's vault. Of these TA stations, 337 are also equipped with aboveground atmospheric sensors; a high-resolution micro-barometer (SETRA 278), a microelectromechanical system (MEMS) barometer and thermometer, and a NCPA infrasound microphone. Each of these instruments outputs data to two channels, one that digitizes at 40 samples per second and another at 1 sample per second.

To enable broader use of these data by the meteorological and atmospheric science community, IRIS Instrumentation Services has developed a brief tutorial on how to access these data. Each station has many different data channels, organized under different location codes. The EP (environment processor) location code represents channels containing temperature and pressure data.

Here is a list of potentially useful channels within EP:

Channel	Instrument	Sample Rate (Hz)	Units
BDF	NCPA infrasound microphone	40	Pascal
LDF		1	Pascal
BDO	SETRA micro barometer	40	Pascal
LDO		1	Pascal
LDM	Q330 MEMS barometer	1	Pascal
LKM	Q330 MEMS thermometer	1	Celsius

This station information is housed as metadata, which is standardized for ease of access. In order to acquire a barometric time series you must first query the metadata in order to find the available stations. The station web service provides this service. It is possible to narrow down any query with the use of the search options, all of which can all be reviewed at www.iris.edu/ws/station/.

IMPORTANT: There is an offset between the SETRA and MEMS barometers. The Setra is -800 mb (-80000 Pa) offset relative to actual atmospheric pressure for stations at low elevation and -600 mb (-60000 Pa) offset for high elevation sites (J04D, H17A, et al. > ~2000 m).

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EXAMPLE: Obtain barometric data for stations within an assigned radius from a specified point.

First query the stations that have data within this radius. This requires inputting a central coordinate and a radius in degrees (1 degree of arc on the earth's surface is ~111km). Be sure to include the proper location code (EP).

Input: <http://www.iris.edu/ws/station/query?lat=30&lon=-90&maxradius=1&loc=EP>

This should return (in XML format) 7 stations located within the area specified. These seven stations have the EP location, which validates the availability of barometric data. To view a map of all available TA stations go to <http://www.iris.edu/gmap/TA>.

To analyze data from one of the stations, utilize the timeseries web service. Select a station code and examine the time period spanned by its deployment. TA stations are moved typically within 2 years, so data at specific locations will only be available for select time periods. Narrow your search accordingly by time with the station web service.

Input:

<http://www.iris.edu/ws/timeseries/query?net=TA&sta=445A&loc=EP&cha=LDO&start=2011-05-01T00:00:00&end=2011-05-20T00:00:00&scale=AUTO&output=plot&ref=direct>
IMPORTANT: Station codes must be typed in CAPS. Providing a specific start and end time format is also required.

This script chooses channel LDO in location EP at station 445A in the TA network from May 1, 2011 to May 20, 2011. The "output=plot" command tells the DMC to output this timeseries as a plot in the browser.

IMPORTANT: The "ref" field should be set to "direct" and the "scale" field should be set to "AUTO" so the measurement units are properly displayed.

Changing the "output" command from plot to ascii2 will download the entire timeseries in a .txt file.

Input:

<http://www.iris.edu/ws/timeseries/query?net=TA&sta=445A&loc=EP&cha=LDO&start=2011-05-01T00:00:00&end=2011-05-20T00:00:00&scale=AUTO&output=ascii2&ref=direct>

To build specific URL requests, visit <http://www.iris.edu/ws/builder/timeseries/>.

These commands are programmatically designed to access significant amounts of data but may be used as a quick and easy reference to a large array of sensors.