bmi_wavewatch3

Release 0.1

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ONE

ABOUT

The *bmi_wavewatch3* Python package provides both a command line interface and a programming interface for downloading and working with WAVEWATCH III data.

bmi_wavewatch3 provides access to the following raster data sources,

- 30 year wave hindcast Phase 1
- 30 year wave hindcast Phase 2
- Production hindcast Singlegrid
- Production hindcast Multigrid

All data sources provide both global and regional grids.

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INSTALLATION

bmi_wavewatch3 can be installed by running `pip install bmi-wavewatch3`. It requires Python >= 3.8 to run.

If you simply can't wait for the latest release, you can install *bmi_wavewatch3* directly from GitHub,

```
$ pip install git+https://github.com/csdms/bmi-wavewatch3
```

bmi_wavewatch3 is also available through *conda*, `conda install bmi-wavewatch3 -c conda-forge`.

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USAGE

To get started, you can download *WAVEWATCH III* data by date with the *ww3* command (use *ww3 –help* to print a brief message),

```
$ ww3 fetch "2010-05-22"
```

You can also do this through Python,

```
>>> from bmi_wavewatch3 import WaveWatch3
>>> WaveWatch3.fetch("2010-05-22")
```

The *bmi_wavewatch3* package provides the `WaveWatch3` class for downloading data and presenting it as an *xarray Dataset*.

```
>>> from bmi_wavewatch3 import WaveWatch3
>>> ww3 = WaveWatch3("2010-05-22")
>>> ww3.data
<xarray.Dataset>
...
```

Use the `inc` method to advance in time month-by-month,

```
>>> ww3.date
'2010-05-22'
>>> ww3.inc()
'2010-06-22'
>>> ww3.data.time
<xarray.DataArray 'time' ()>
array('2010-06-01T00:00:00.000000000', dtype='datetime64[ns]')
...
```

This will download new datasets as necessary and load the new data into the `data` attribute.

Note: If the new data are not cached on you computer, you will notice a delay while the new data are download. If the `lazy` flag is set, the download will only occur once you try to access the data (i.e. `ww3.data`), otherwise the data are downloaded as soon as the date is set.

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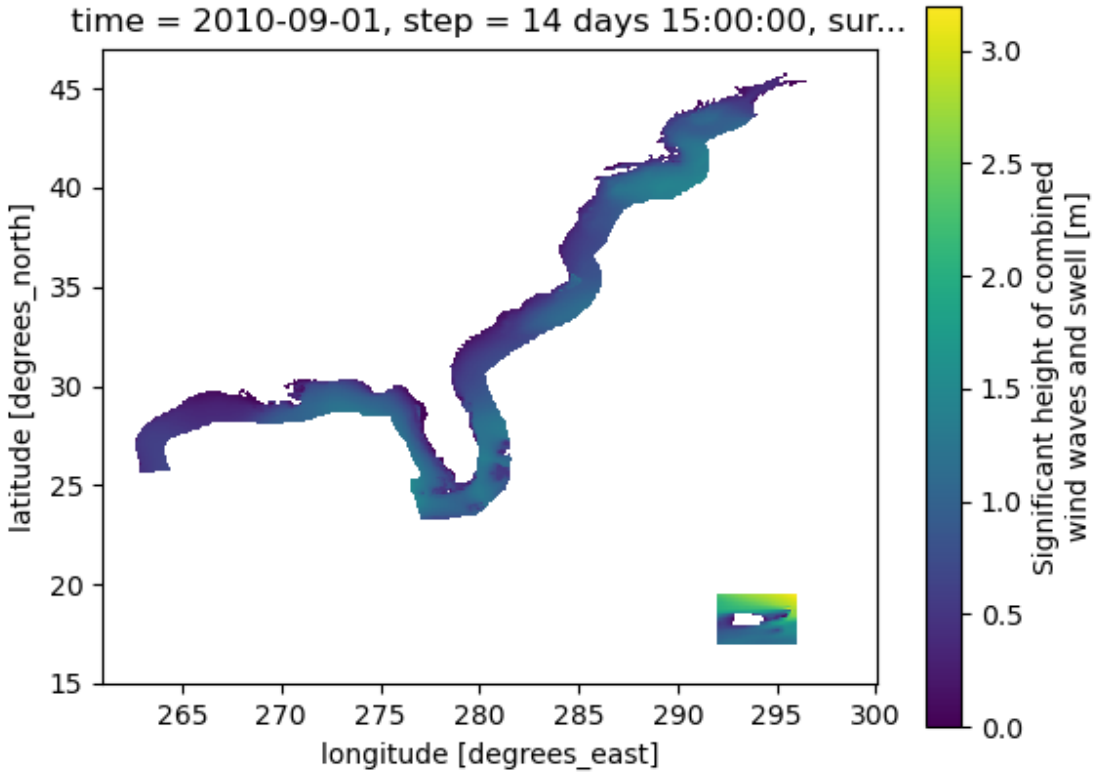
EXAMPLE

4.1 Plot data from the command line

Running the following from the command line will plot the variable *significant wave height* from the WAVEWATCH III *at_4m* grid. Note that the time of day (in this case, 15:00) is separated from the date with a `T` (i.e. times can be given as `YYYY-MM-DDTHH`)

```
$ ww3 plot --grid=at_4m --data-var=swh "2010-09-15T15"
```



4.2 Plot data from Python

This example is similar to the previous but uses the *bmi_wavewatch3* Python interface.

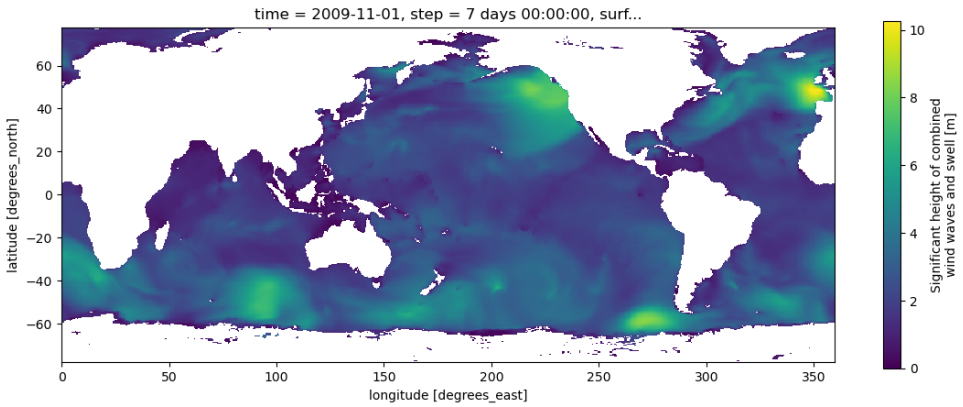
```
>>> from bmi_wavewatch3 import WaveWatch3
>>> ww3 = WaveWatch3("2009-11-08")
```

The data can be accessed as an *xarray Dataset* through the `data` attribute.

```
>>> ww3.data
<xarray.Dataset>
Dimensions:     (step: 241, latitude: 311, longitude: 720)
Coordinates:
    time        datetime64[ns] 2009-11-01
  * step        (step) timedelta64[ns] 0 days 00:00:00 ... 30 days 00:00:00
    surface     float64 1.0
  * latitude    (latitude) float64 77.5 77.0 76.5 76.0 ... -76.5 -77.0 -77.5
  * longitude   (longitude) float64 0.0 0.5 1.0 1.5 ... 358.0 358.5 359.0 359.5
    valid_time  (step) datetime64[ns] dask.array<chunksize=(241,), meta=np.ndarray>
Data variables:
    dirpw       (step, latitude, longitude) float32 dask.array<chunksize=(241, 311, 720),
↪ meta=np.ndarray>
    perpw       (step, latitude, longitude) float32 dask.array<chunksize=(241, 311, 720),
↪ meta=np.ndarray>
    swh         (step, latitude, longitude) float32 dask.array<chunksize=(241, 311, 720),
↪ meta=np.ndarray>
    u           (step, latitude, longitude) float32 dask.array<chunksize=(241, 311, 720),
↪ meta=np.ndarray>
    v           (step, latitude, longitude) float32 dask.array<chunksize=(241, 311, 720),
↪ meta=np.ndarray>
Attributes:
    GRIB_edition:            2
    GRIB_centre:             kwbc
    GRIB_centreDescription:  US National Weather Service - NCEP
    GRIB_subCentre:          0
    Conventions:             CF-1.7
    institution:             US National Weather Service - NCEP
    history:                 2022-06-08T16:08 GRIB to CDM+CF via cfgrib-0.9.1...
```

The `step` attribute points to the current time slice into the data (i.e number of three hour increments since the start of the month),

```
>>> ww3.step
56
>>> ww3.data.swh[ww3.step, :, :].plot()
```



4.2.1 Release Notes

0.2.0 (2022-06-17)

New Features

- Added a new subcommand, *plot*, to the *ww3* command-line program. `ww3 plot` with download (if the data files are not already cached) and create a plot of the requested data. (#13)

Bug Fixes

- Fixed a bug in the reporting of an error caused by an invalide datatime string. (#13)

0.1.1 (2022-06-10)

Other Changes and Additions

- Set up GitHub Action to create a source distribution and push it to *TestPyPI*. This action is only run if the version tag is a prerelease version (i.e. the version string ends with `[ab][0-9]+`). (#10)
- Set up GitHub Action to create a source distribution and push it to *PyPI*. This action is only run if the version tag is a release version (i.e. the version string doesn't end with `[ab][0-9]+`). (#11)

0.1.1b1 (2022-06-09)

New Features

- Added `ww3` command line interface to download WaveWatch III data by date, region and quantity (significant wave height, wind speed, etc.). (#1)
- Added `WaveWatch3` class, which is the main access point for users of this package. This class downloads WaveWatch III data files (if not already cached) and provides a view of the data as an xarray Dataset. Users can then advance through the data month-by-month, downloading additional data as necessary. (#3)
- Added the `ww3 clean` subcommand that removes cached data files. (#4)

- Added `BMIWaveWatch3` class to provide a Basic Model Interface for the *wavewatch3* package. (#5)
- Added additional WaveWatch III data sources from which users can fraw data from. (#6)
- Added `fetch` method to WaveWatch3 to mimic the command line program `ww3 fetch`. (#7)
- Added additional data sources from which to retreive data from. Available data sources now include: Phase 1, Phase 2, Multigrid, Multigrid-extended, and Multigrid-thredds. (#7)
- Added `ww3 info` command to print information (e.g. available grids, quantities, etc.) about data sources. (#7)
- Added a `step` property to `WaveWatch3` to track the current time slice of the data cube. This property is also settable so that a user can use it to advance throught the data (additional data are downloaded in the background as needed). (#8)
- Dates can now be specified as iso-formatted date/time strings. For example, "1944-06-06T06:30". (#8)
- Rename package to `bmi_wavewatch3`. This follows the convention used by other CSDMS data components. (#9)

Documentation Enhancements

- Added package description, installation, usage, and an example to the documentation. (#8)

Other Changes and Additions

- Set up continuous integration using GitHub actions. This includes tests to ensure that the code is styled according to *black*, is free of lint, and passes all unit tests. (#2)
- Added more unit tests, particularly for data sources. (#7)
- Added a GitHub action to build the sphinx-based documentation as part of the continuous integration. (#8)
- Better error reporting for the command line interface for HTTP errors when retreiving data as well as input validation. (#8)
- Set up GitHub Action to create a source distribution and push it to *TestPyPI*. This action is only run if the version tag is a prerelease version (i.e. the version string ends with `[ab][0-9]+`). (#10)

4.2.2 Credits

Development Lead

- Eric Hutton (@mcflugen)

Contributors

None yet. Why not be the first?

4.2.3 The MIT License (MIT)

CHAPTER

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INDICES AND TABLES

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