Automating Model Skill Assessment with Python

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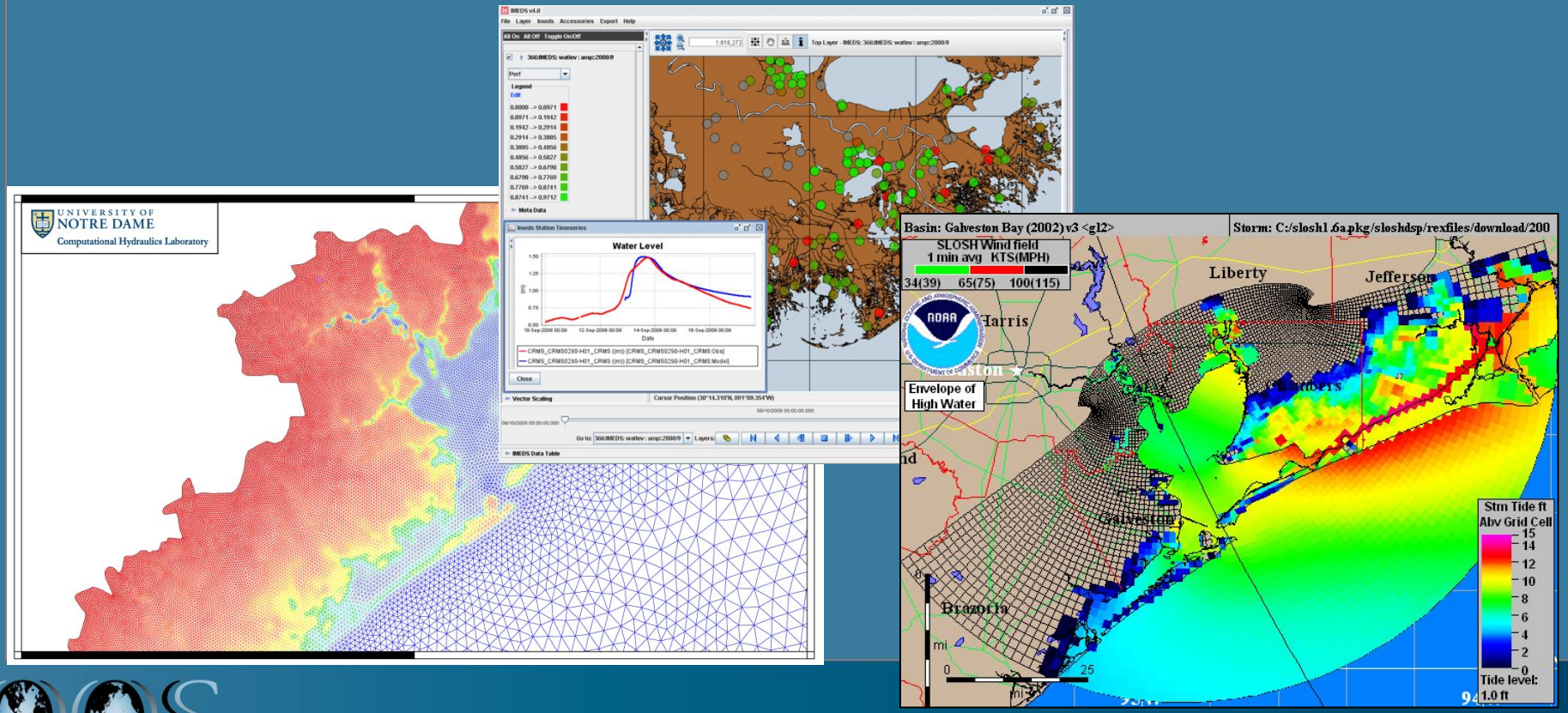
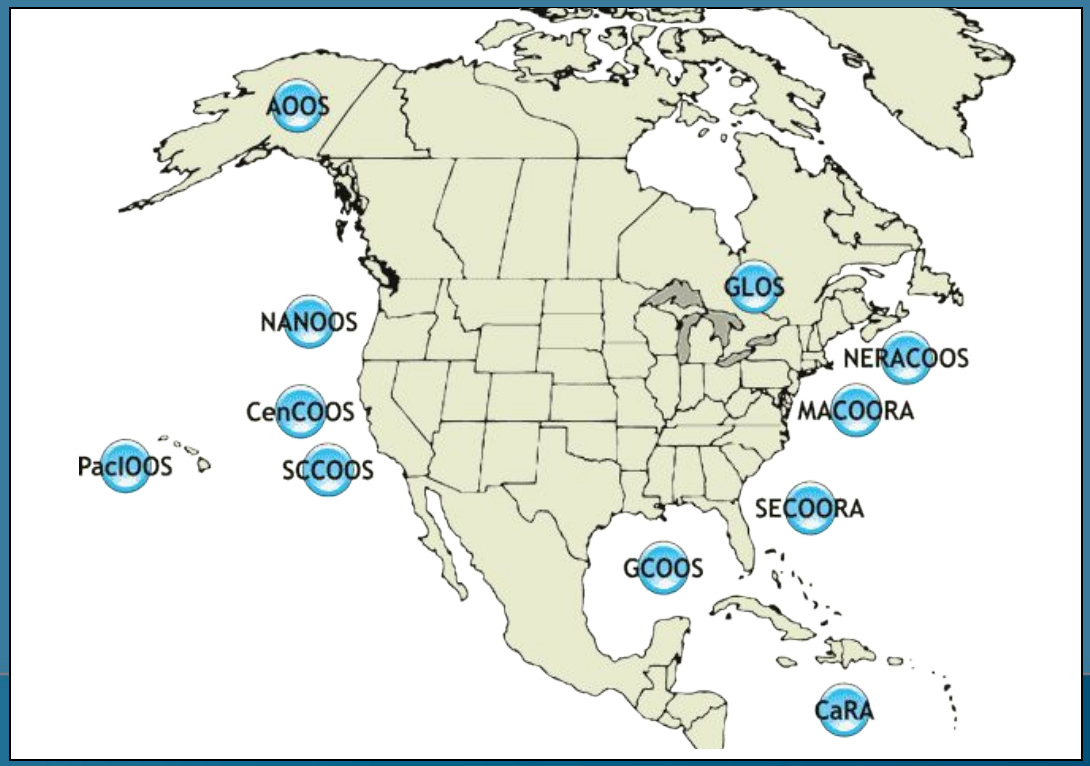


US Integrated Ocean Observing System (IOOS®)

IOOS® Plan defines:

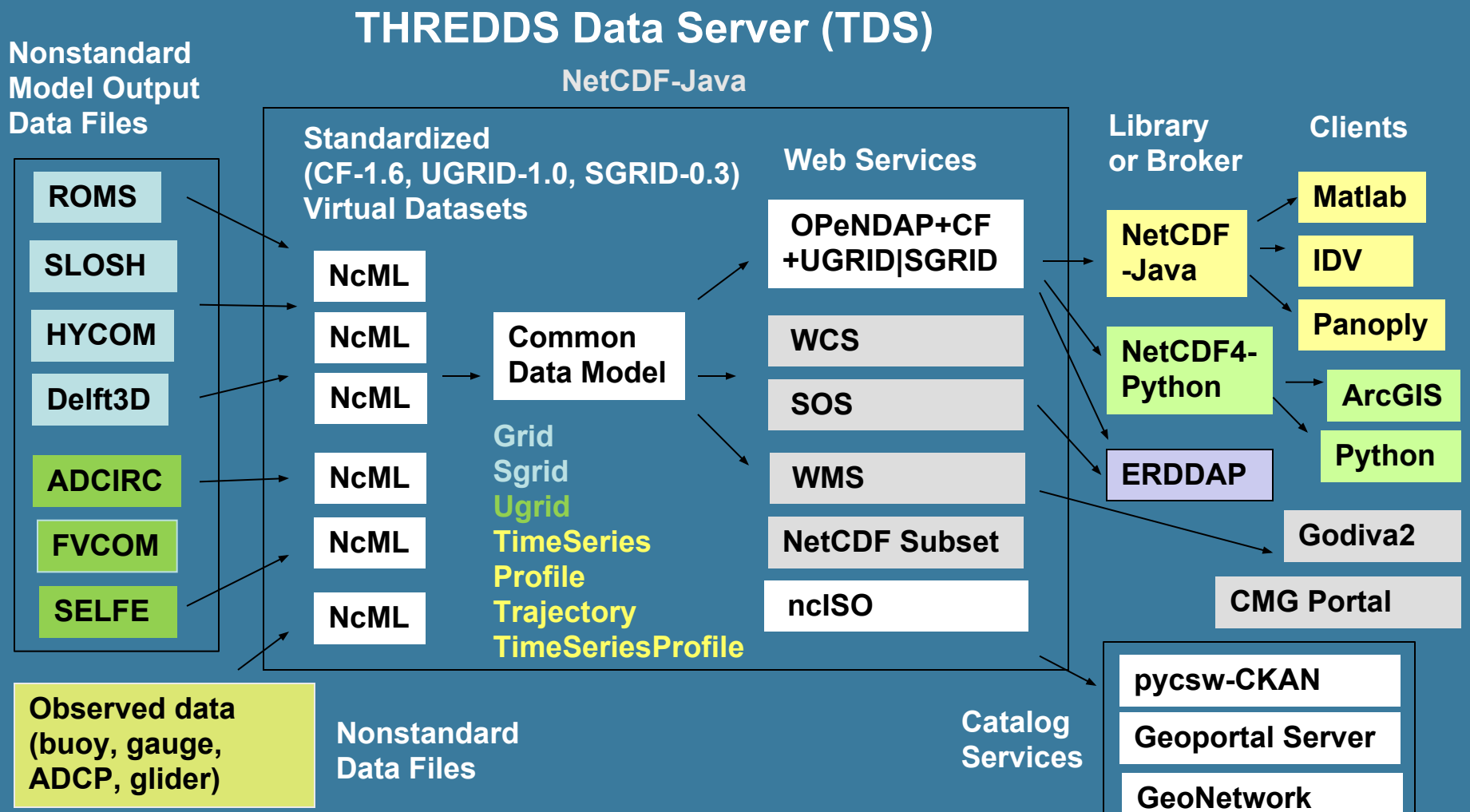
- Global Component
- Coastal Component
  - 17 Federal Agencies
  - 11 Regional Associations



IOOS Recommended Web Services and Data Encodings

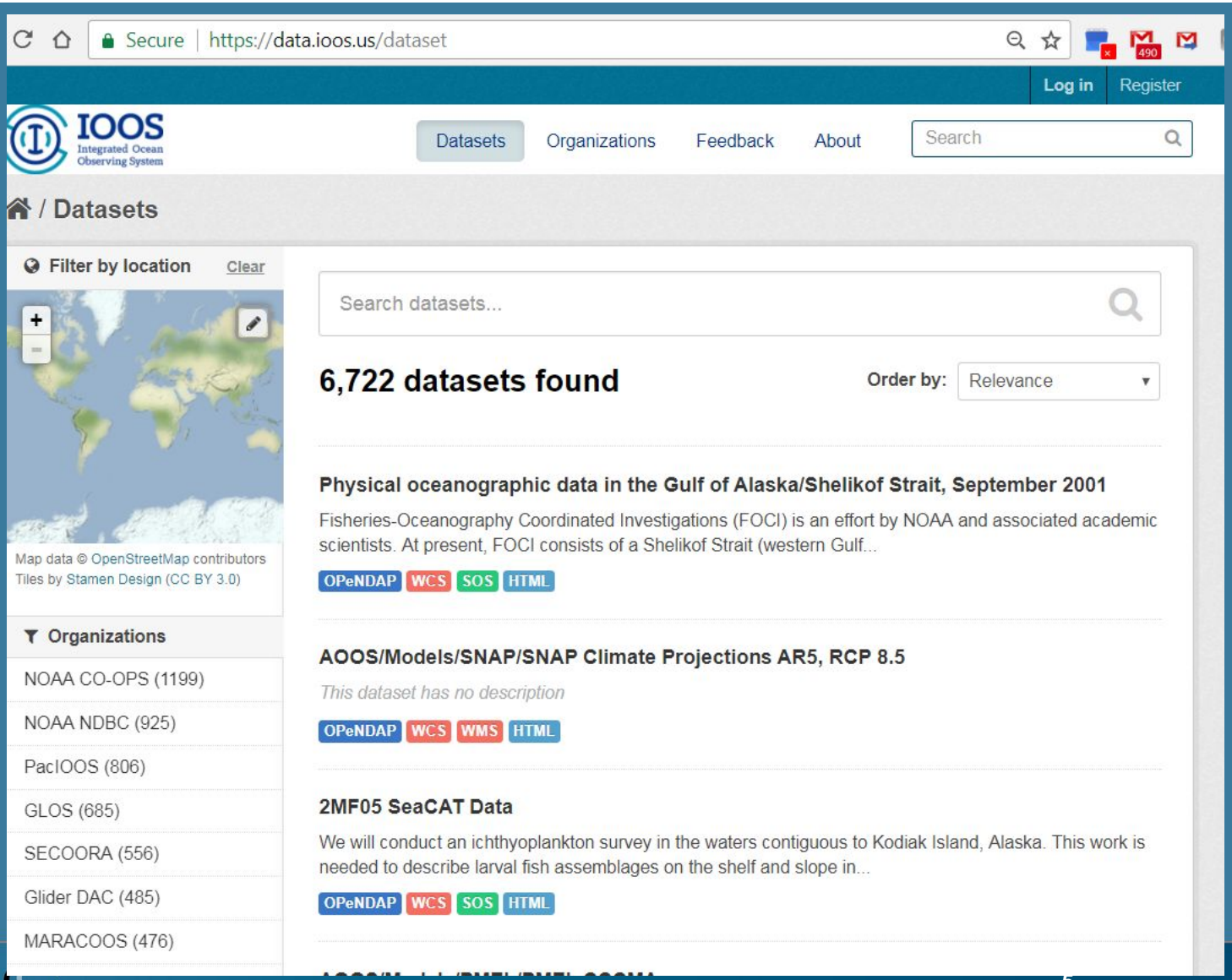
Data Type	Web Service	Encoding
In-situ data (buoys, piers, towed sensors)	OGC Sensor Observation Service (SOS)	XML or CSV
Gridded data (model outputs, satellite)	OPeNDAP with Climate and Forecast Conventions	Binary DAP using Climate and Forecast (CF) conventions
Images of data	OGC Web Map Service (WMS)	GeoTIFF, PNG etc. -possibly with standardized styles

IOOS Model Data Interoperability Design



sudo apt-get docker
docker run –d unidata/thredds-docker

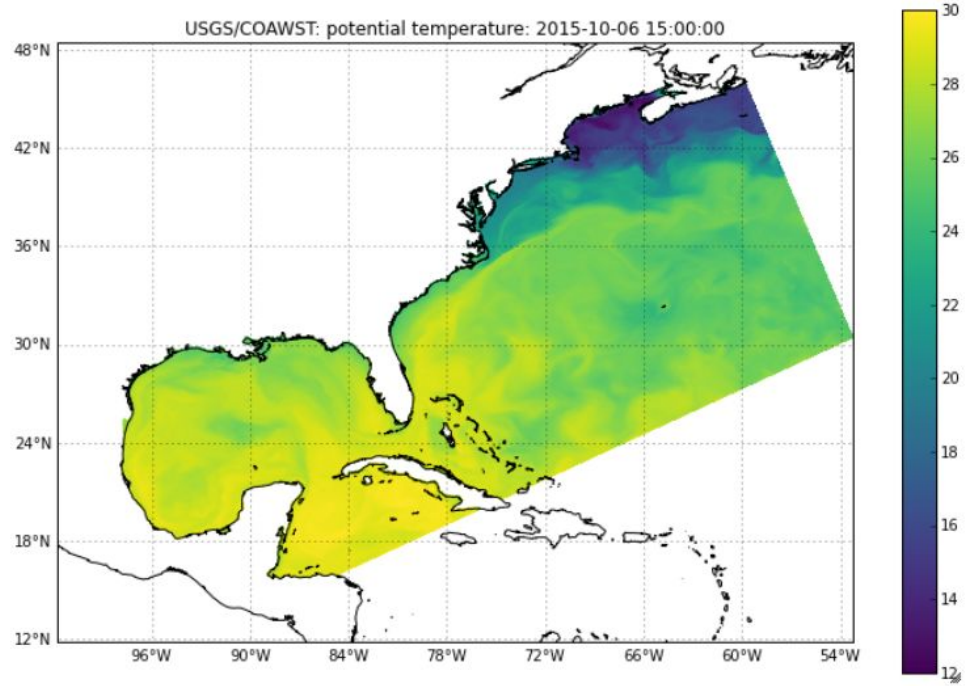
IOOS Catalog



Interoperable Access in Python (Iris)

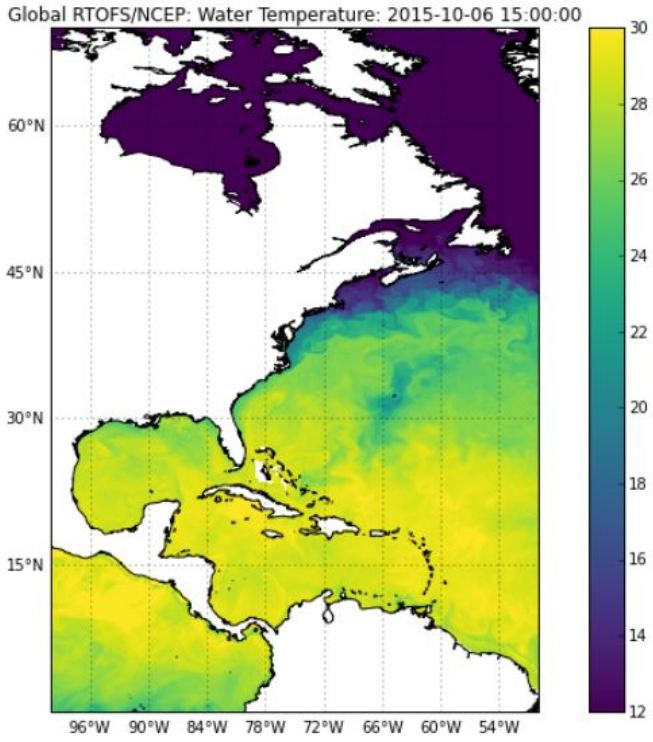
[13]:
```
model = 'USGS/COAWST'
url = 'http://geoport.whoi.edu/thredds/dodsC/coawst_4/use/fmrc/coawst_4_use_best.ncd'
var = 'sea_water_potential_temperature'
lev = -1
icube = var_lev_date(url=url, var=var, mytime=mytime, lev=lev, subsample=1)
map_plot(icube, model=model)
```

```
slice retrieved in 9.351569 seconds
```

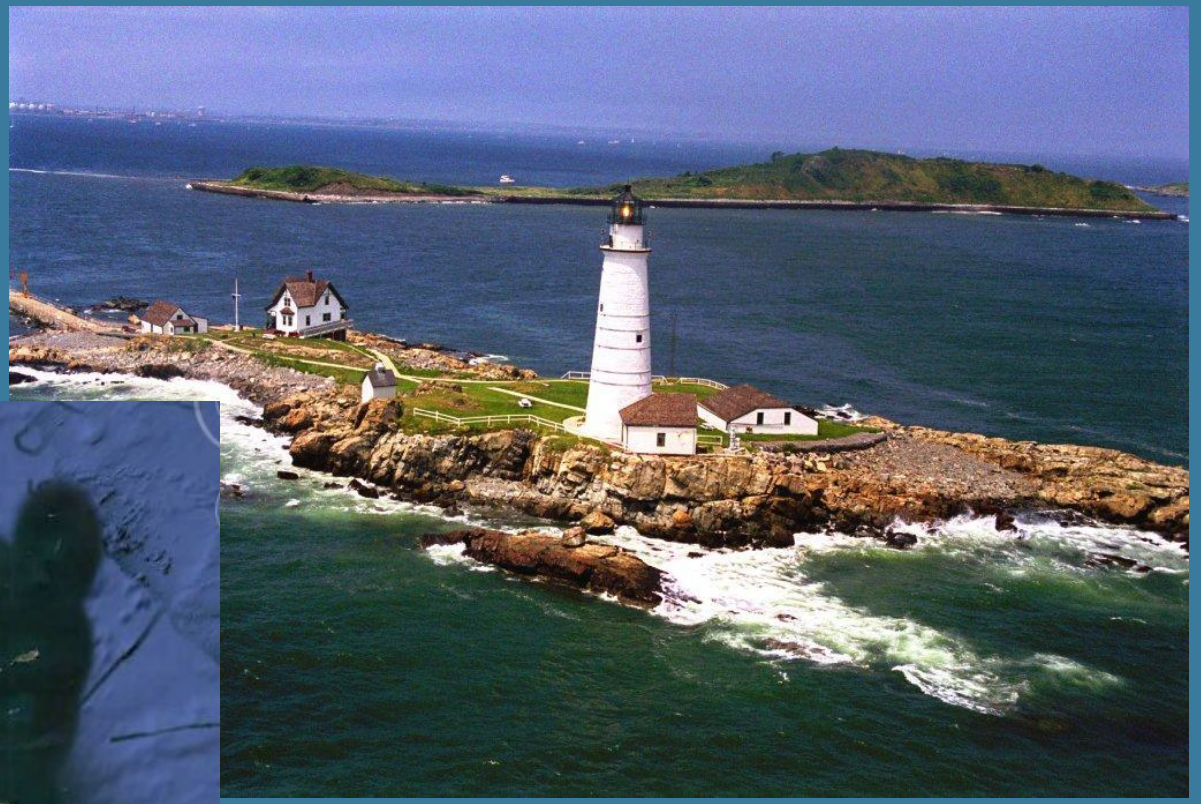


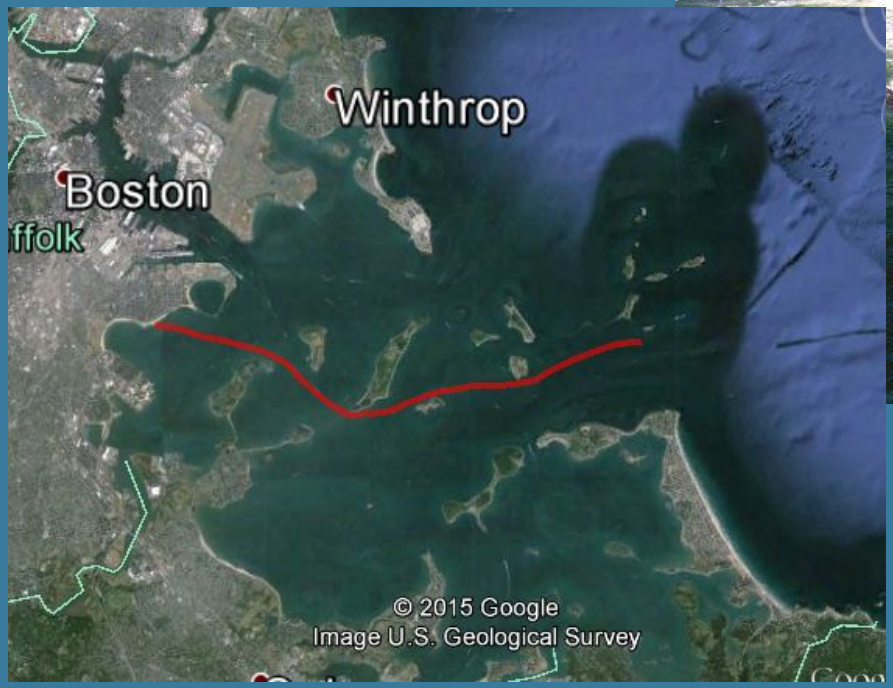
In [30]:
```
model='Global RTOFS/NCEP'
url='http://ecowatch.ncddc.noaa.gov/thredds/dodsC/hycom/
var='sea_water_temperature'
lev=1
icube = var_lev_date(url=url,var=var, mytime=mytime, lev
map_plot(icube, model=model)
```

```
slice retrieved in 2.475246 seconds
```



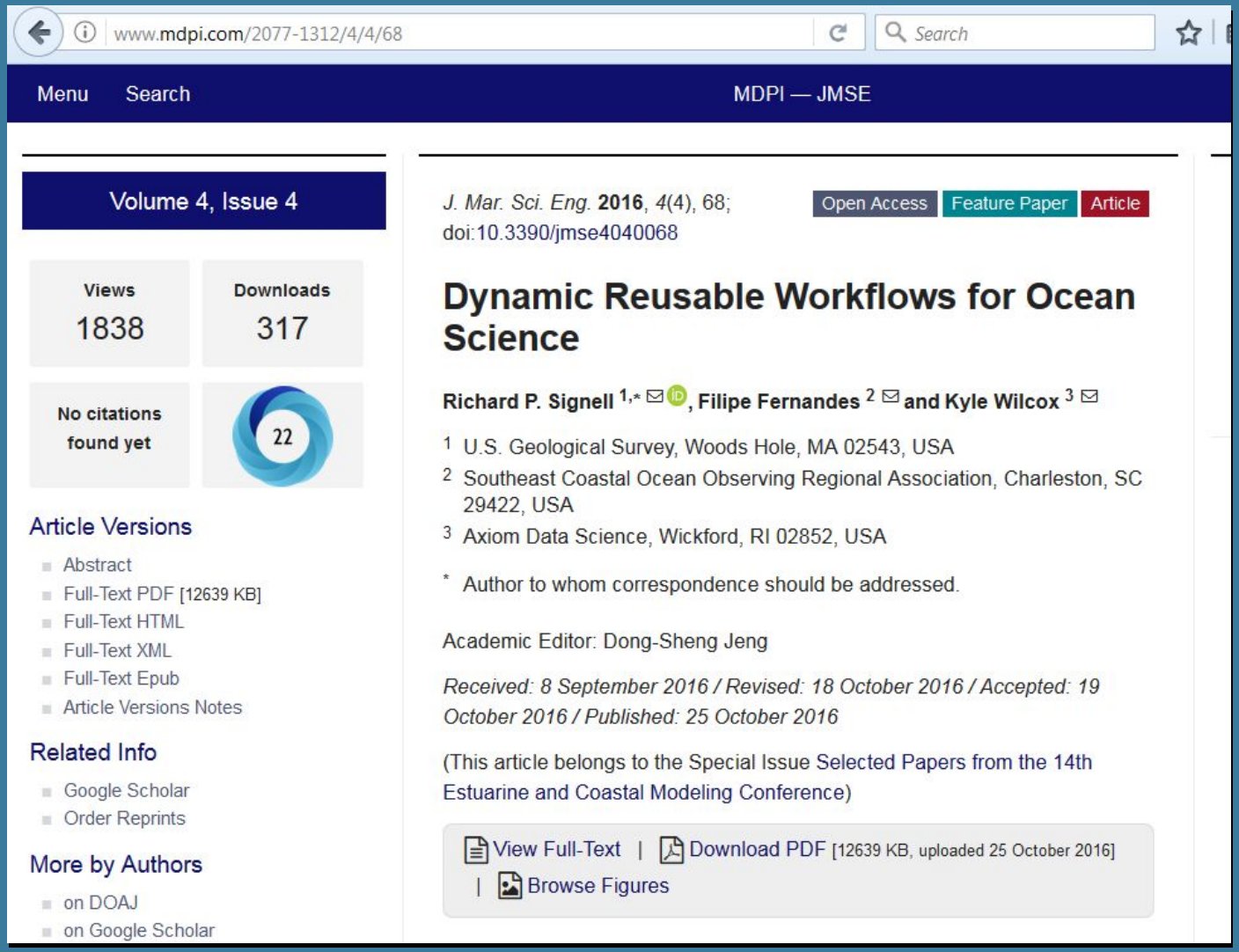
Boston Light Swim





8 mile swim
No wet suit
How cold will the water be?

Boston Light Swim Paper



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J. Mar. Sci. Eng. **2016**, *4*(4), 68;
doi:10.3390/jmse4040068

Open Access Feature Paper Article

Dynamic Reusable Workflows for Ocean Science

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Academic Editor: Dong-Sheng Jeng

Received: 8 September 2016 / Revised: 18 October 2016 / Accepted: 19 October 2016 / Published: 25 October 2016

(This article belongs to the Special Issue Selected Papers from the 14th Estuarine and Coastal Modeling Conference)

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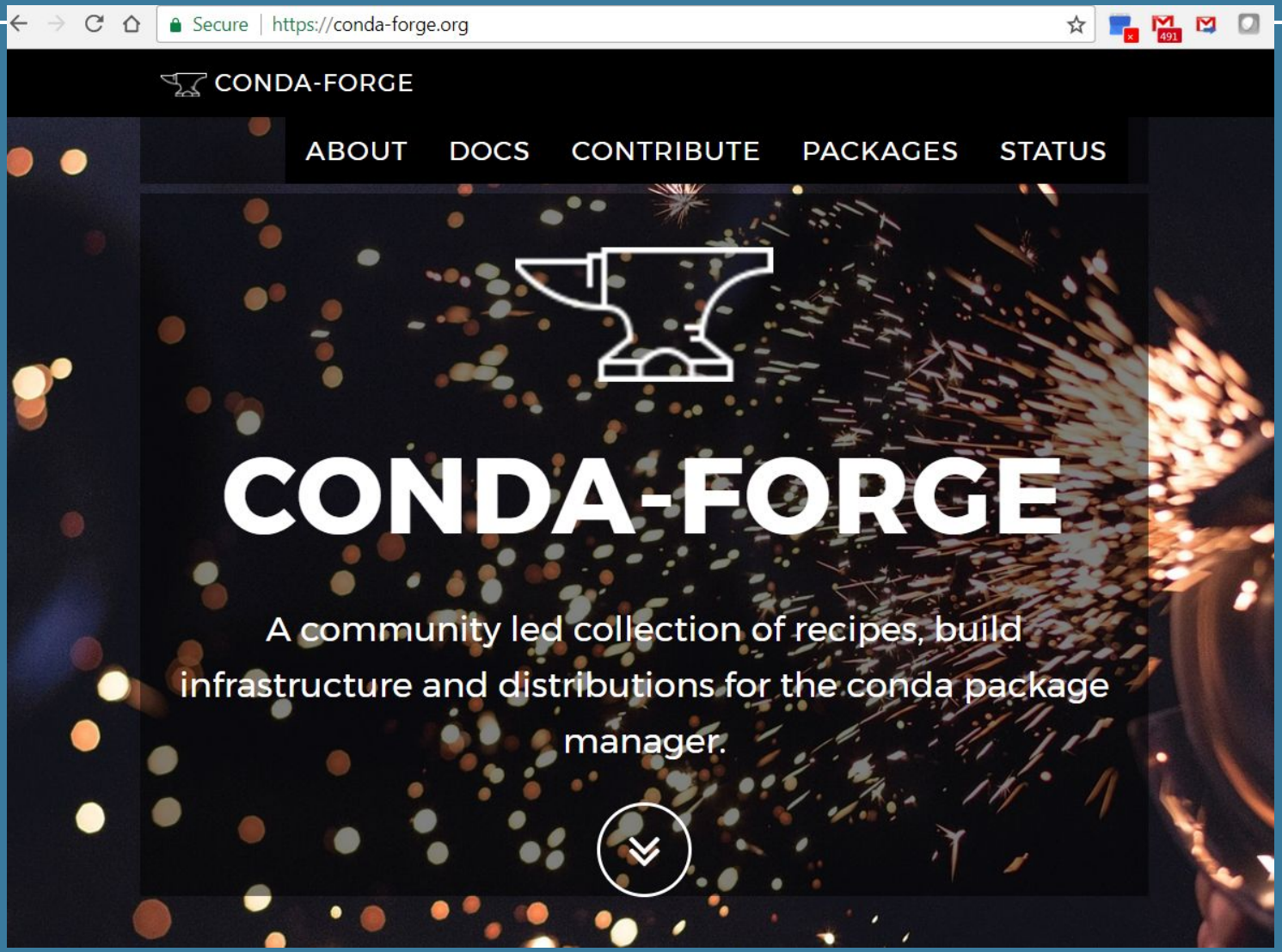
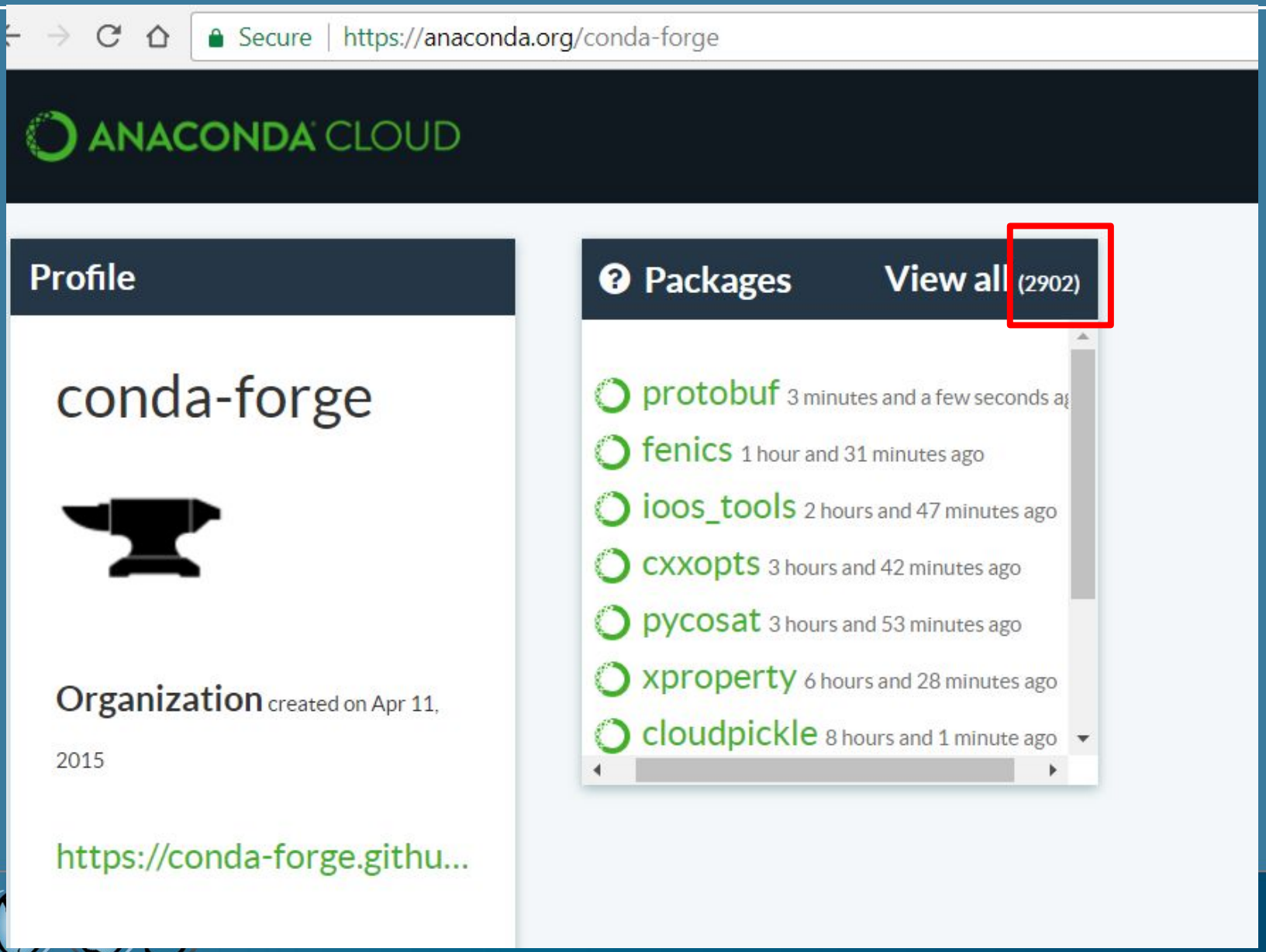
Demo

Conda-Forge is Awesome



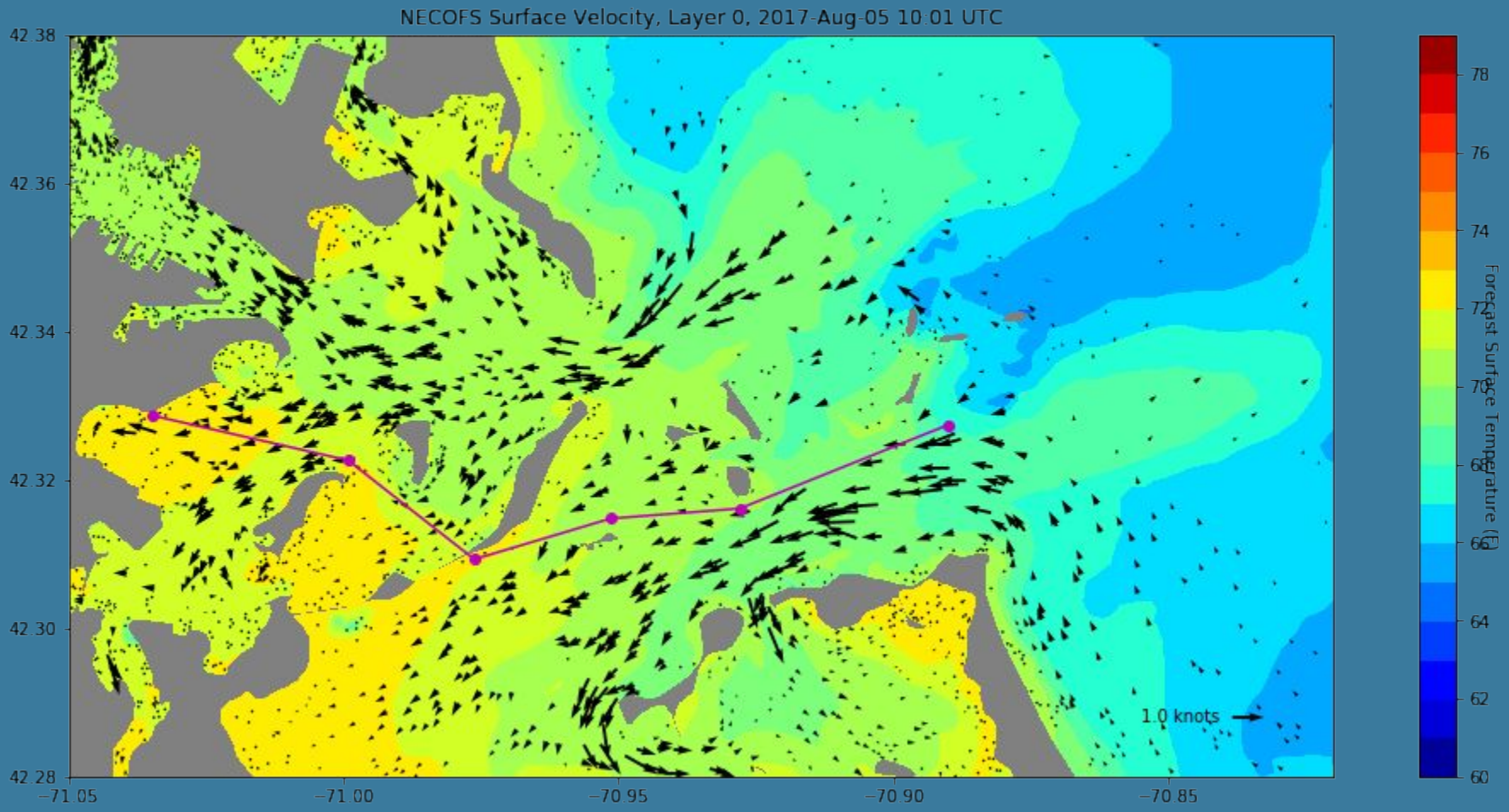
2900+ packages and growing!



Summary

- Standardized framework makes skill assessment easy and powerful
- Services are now easy to install and maintain
- Skill assessment notebooks are reproducible by others (for free)
- More assessment leads to more appropriate use of modeling products
- More assessment of models leads to better models

Demo


NECOFS Surface Velocity, Layer 0, 2017-Aug-05 10:01 UTC
42.38
42.36
42.34
42.32
42.30
42.28
−71.05
−71.00
−70.95
−70.90
−70.85
1.0 knots
78
76
74
72
70
68
66
64
62
60
Forecast Surface Temperature (F)

Boston Light Swim Notebook

https://hub.binder-beta.omgwtf.in/user/d27da825-6e1e-4101-9b3d-04d406a807f8/notebooks/notebooks/

jupyter 2016-12-22-boston_light_swim Last Checkpoint: 22 minutes ago (autosaved)

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File Edit View Insert Cell Kernel Widgets Help | Trusted | Python [default]

Code

```
for station in dfs:
    sta_name = all_obs[station]
    df = dfs[station]
    if df.empty:
        continue
    p = make_plot(df, station)
    maker = make_marker(p, station)
    maker.add_to(m)

m
```

Out[24]: