

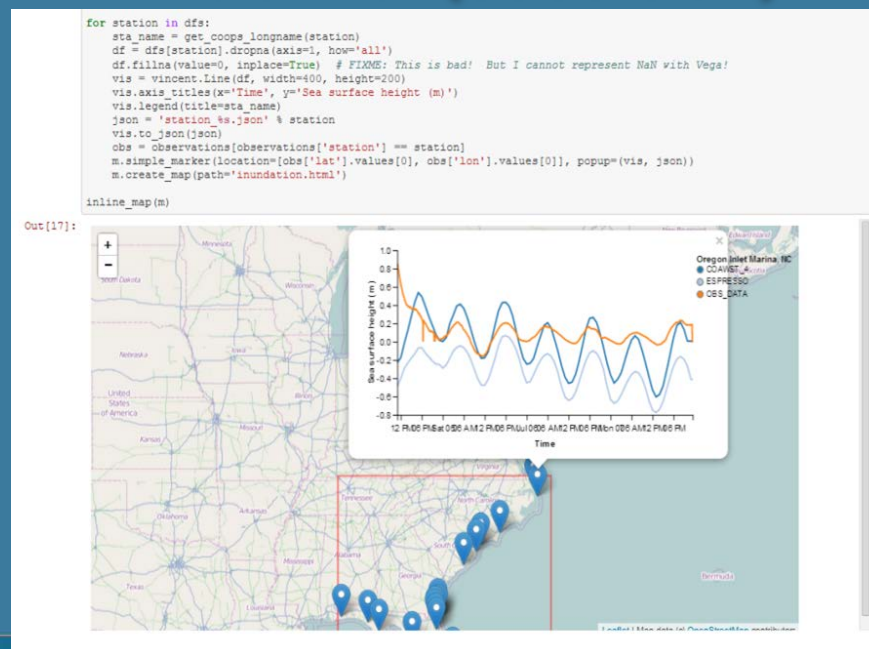
IOOS Catalog and Service Requirements to Support Catalog-Driven Workflows

Rich Signell (USGS-CMG)

Filipe Fernandes (SECOORA)

Kyle Wilcox (Axiom Data Science)

Andrew Yan (USGS-CIDA)

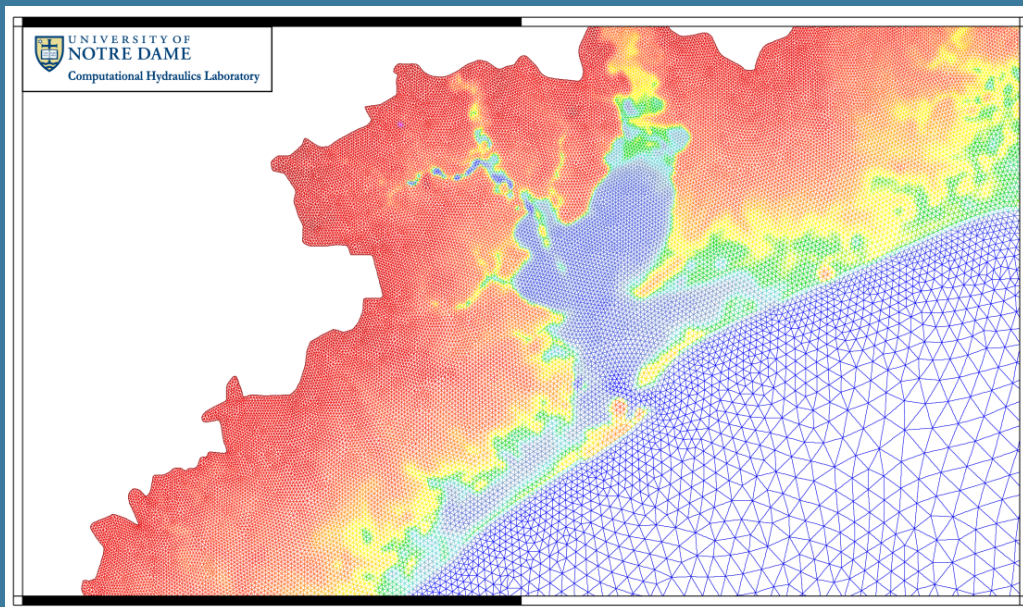


Why not just use ERDDAP?

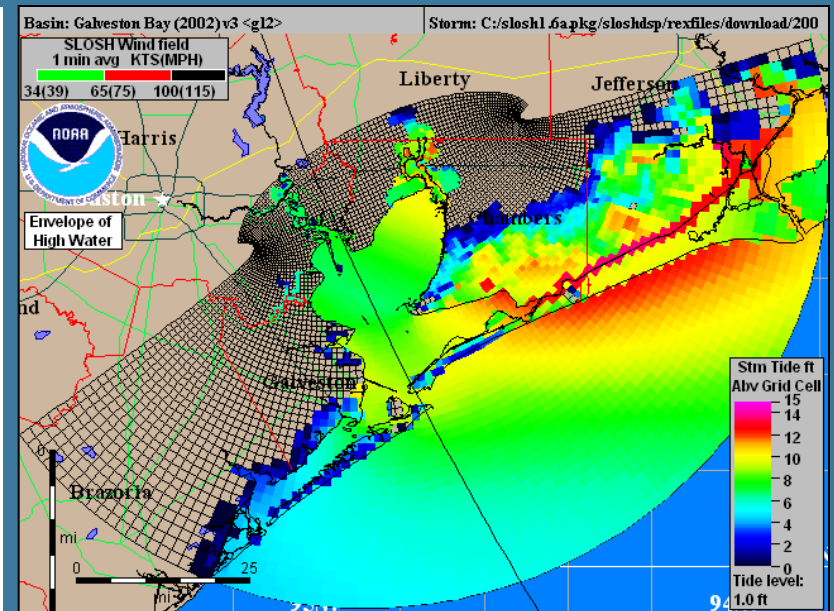
ERDDAP supports uniform grids, but doesn't support:

Unstructured Grids (ADCIRC, FVCOM, SELFE, ...)

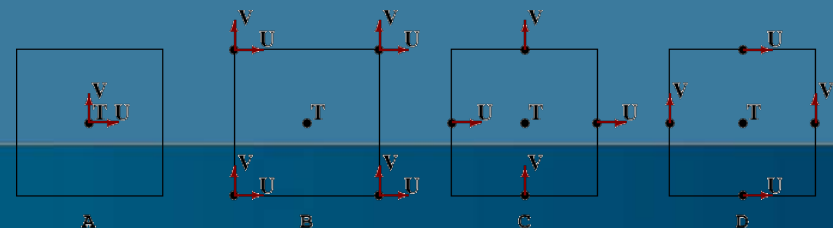
Curvilinear Grids (ROMS, SLOSH, HYCOM...)



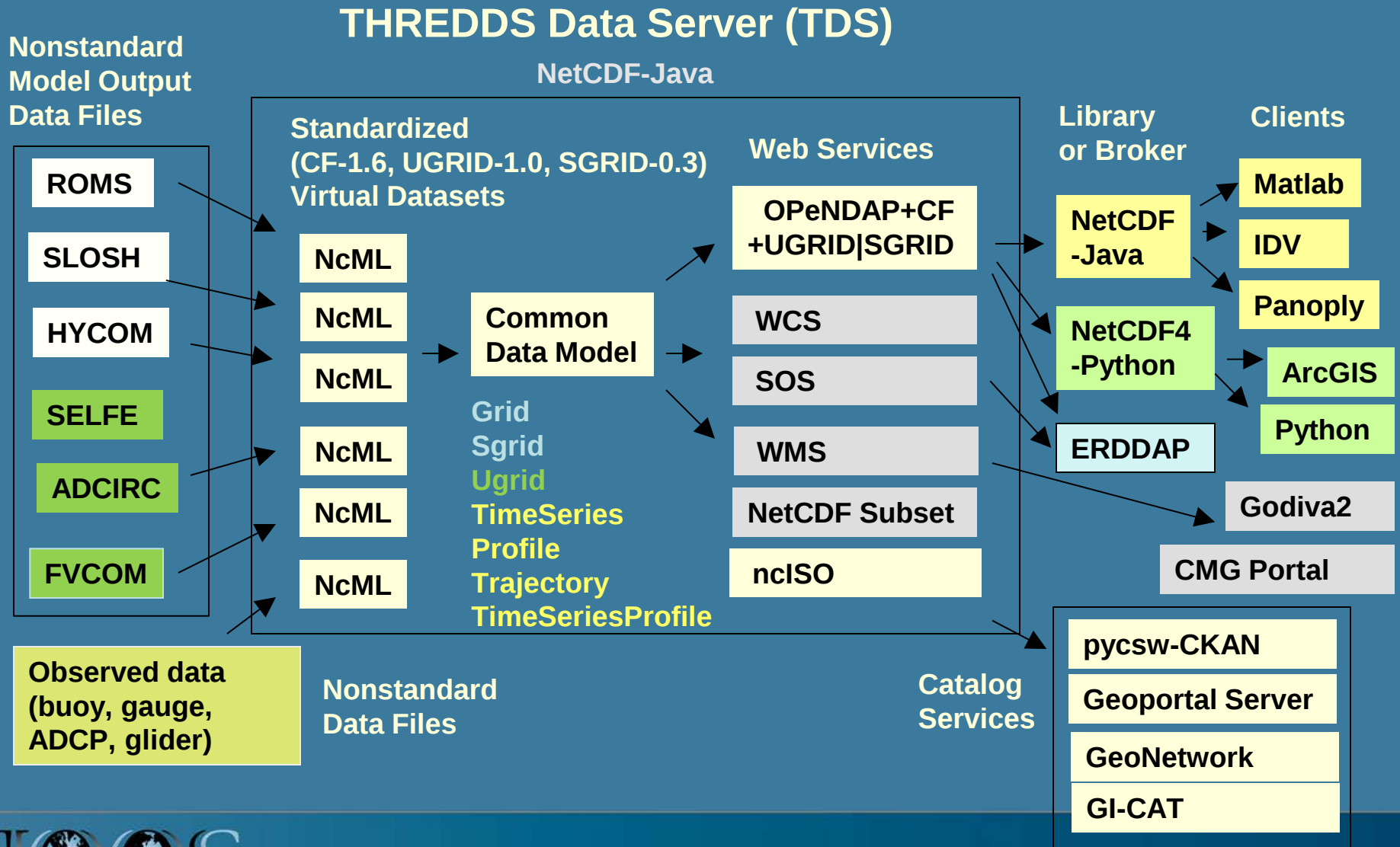
Use OPeNDAP +CF, +UGRID conventions



Use OPeNDAP +CF (and +SGRID if staggered)



IOOS Model Data Interoperability Design



ncISO (NetCDF to ISO)

- <https://github.com/Unidata/threddsiso>
- Included in TDS 4.2.4+, but must be enabled
- Handles time, naming authority, properly in version 2.8 (and in TDS 4.6.1+)
- Standalone ncISO (<http://www.ngdc.noaa.gov/eds/tds>) is still at version 2.3
- Kevin O'Brien, Roland Schweitzer & Unidata team are working on integration of stand-alone ncISO into THREDDS ncISO (adding command line capabilities)

pycsw (Python-based CSW)

- <https://github.com/geopython/pycsw>
- Need version 1.10.3 or higher to support query by ServiceType (like OPeNDAP or SOS)

Catalog workflow for TDS data

- At least every day, providers update ISO metadata records in a WAF (web accessible folder):
 - Crawl THREDDS catalogs using Python script, extracting ISO metadata from ncISO TDS services
 - Crawl THREDDS catalogs using standalone ncISO jar file, generating ISO metadata from OPeNDAP services
- At least every day, use script to have pycsw harvest ISO metadata from list of WAFs, eliminating records no longer in WAFs

Standardized access to Unstructured Grid data



The screenshot shows the GitHub repository page for 'ugrid-conventions' by 'pyugrid'. The repository is described as 'Unstructured Grid Metadata Co' and was updated on Apr 14. The page includes a search bar, filters, and a list of repositories. The 'ugrid-conventions' repository is highlighted, showing its description, website, and commit history.

☐ **V: Array of 32 bit Reals** [time2 = 0..383][sigma = 0..10][node = 0..592760]

time2: sigma: node:

long_name: Northward Water Velocity
missing_value: -999.
standard_name: northward_sea_water_velocity
mesh: selfe_mesh
location: node

☐ **selfe_mesh: 32 bit Integer**

selfe_mesh =

cf_role: mesh_topology
topology_dimension: 2
node_coordinates: x y
face_node_connectivity: ele

pyugrid / pyugrid Unwatch 8

Description **Website**

Short description of this repository Website for this repository (optional) **Save** or [cancel](#)

60 commits 1 branch 1 release 7 contributors

branch: master **pyugrid / +**

Removed Cython requirement from .travis.yml

cbcunc authored 6 days ago latest commit 35d3d0bb92

notebook_examples	really updated the code for not requiring standard_name.	10 days ago
pyugrid	Merge pull request #29 from robmcmullen/master	10 days ago
scripts	added writing associated data	26 days ago
test	Merge pull request #29 from robmcmullen/master	10 days ago



SGRID Conventions: github/sgrid

← → × 🏠 [GitHub, Inc. \[US\] https://github.com/sgrid/pysgrid](https://github.com/sgrid/pysgrid)

 This repository Search

 **sgrid / pysgrid**

Python tools for sgrid — Edit

🔒 294 commits 1 branch

 branch: master **pysgrid / +**

Merge pull request #53 from ayan-usgs/master ...

 **ayan-usgs** authored 17 hours ago

 pysgrid	added notebook example
 .gitattributes	added .gitignore and .gitattributes file
 .gitignore	Use setuptools for packaging
 .travis.yml	Append test requirements onto norm
 MANIFEST.in	Use setuptools for packaging
 README.md	more readme changes
 requirements-test.txt	Append test requirements onto norm

```

v:grid = "grid" ; // SGRID attribute
v:location = "edge2" ; // SGRID attribute
float zeta(ocean_time, eta_rho, xi_rho) ;
zeta:long_name = "free-surface" ;
zeta:units = "meter" ;
zeta:time = "ocean_time" ;
zeta:coordinates = "lat_rho lon_rho" ;
zeta:grid = "grid" ; // SGRID attribute
zeta:location = "face" ; // SGRID attribute

// SGRID variable
int grid ;
grid:cf_role = grid_topology
grid:topology_dimension = 2 ;
grid:node_dimensions = "xi_psi eta_psi" ;
grid:face_dimensions = "xi_rho: xi_psi (padding: both) eta_rho: eta_psi (padding: both)" ;
grid:edge1_dimensions = "xi_u: xi_psi eta_u: eta_psi (padding: both)" ;
grid:edge2_dimensions = "xi_v: xi_psi (padding: both) eta_v: eta_psi" ;
grid:node_coordinates = "lon_psi lat_psi" ;
grid:face_coordinates = "lon_rho lat_rho" ;
grid:edge1_coordinates = "lon_u lat_u" ;
grid:edge2_coordinates = "lon_v lat_v" ;
grid:vertical_dimensions = "s_rho: s_w (padding: none)" ;

// global attributes:
:Conventions = "CF-1.0" ;
:title = "ROMS/TOMS 2.2 - Adria02 Uber Run" ;
}
    
```

WRF (ARW version)

The WRF-ARW also uses a C-grid. In this case, models could also result in 3D grid topologies structured (layered) grid in the vertical, but the

It might be interesting to verify the result for V

```

netcdf wrfout_v2_Lambert {
dimensions:
    
```

faces1: nodes (padding: none)



faces2: nodes (padding: low)



faces3: nodes (padding: high)



faces4: nodes (padding: both)



Automated model comparison

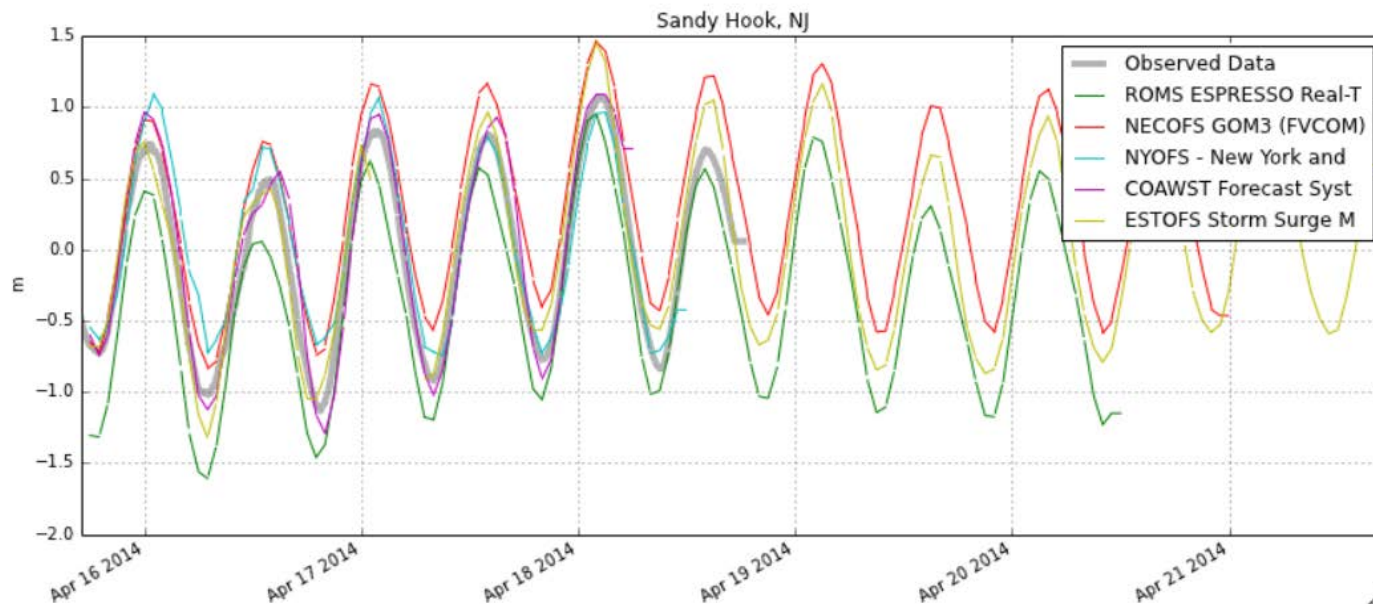
IP[y]: Notebook

IOOS_inundation Last Checkpoint: Mar 15 16:08 (autosaved)

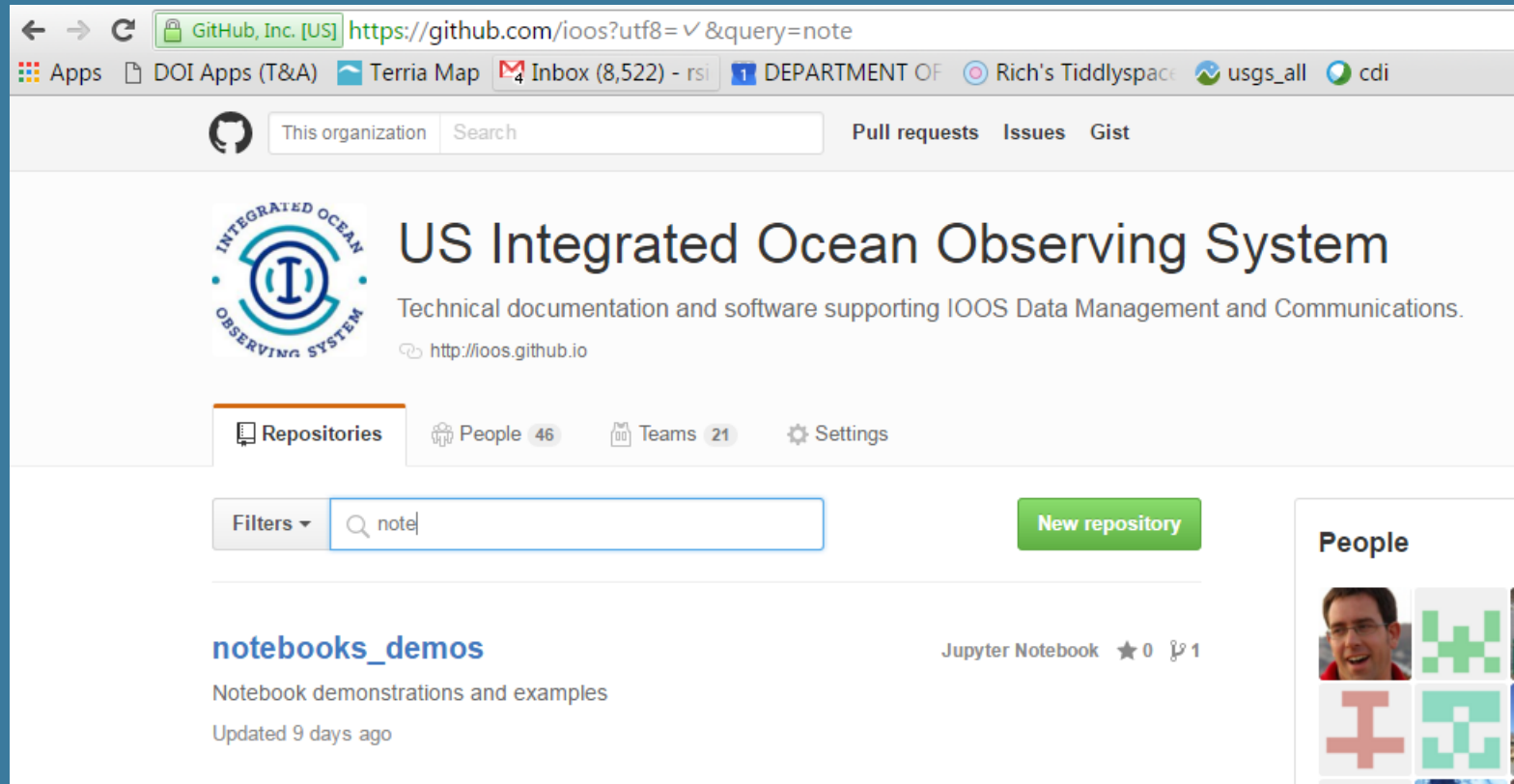
File Edit View Insert Cell Kernel Help

Code Cell Toolbar: None

```
In [45]: for df in obs_df:
          df.plot(figsize=(14,6),title=df.name)|
          ylabel('m')
```



Notebook Demos



← → ↻  GitHub, Inc. [US] <https://github.com/ioos?utf8=✓&query=note>

Apps  DOI Apps (T&A)  Terria Map  Inbox (8,522) - rsi  DEPARTMENT OF  Rich's Tiddlyspace  usgs_all  cdi

 This organization [Pull requests](#) [Issues](#) [Gist](#)

 **US Integrated Ocean Observing System**
Technical documentation and software supporting IOOS Data Management and Communications.
<http://ioos.github.io>

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notebooks_demos Jupyter Notebook ★ 0 🍴 1
Notebook demonstrations and examples
Updated 9 days ago

People





 [ioos / notebooks_demos](#)

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↔ Code  Issues 4  Pull requests 0  Wiki  Pulse  Graphs  Settings

Notebook demonstrations and examples — Edit

 6 commits

 1 branch

 0 releases

 1 contributor

Branch: master ▾

New pull request

Create new file

Upload files

Find file

Clone or download ▾

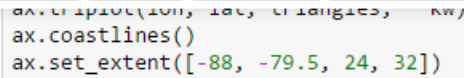
 ocephaf Merge pull request #6 from ocephaf/ad_badge ... Latest commit 51b7080 9 days ago

 conventions	Parsing conventions with Python	9 days ago
 LICENSE	Initial commit	23 days ago
 README.md	Add binder badge	9 days ago
 environment.yml	Parsing conventions with Python	9 days ago
 index.ipynb	Parsing conventions with Python	9 days ago

 README.md

IOOS demonstrations and examples notebooks

launch 



methods with pyugrid. You can see the full pyugrid example [here](#).

SGRID-0.3 (pysgrid)

<http://sgrid.github.io/sgrid/>

```
In [12]: import pysgrid
```

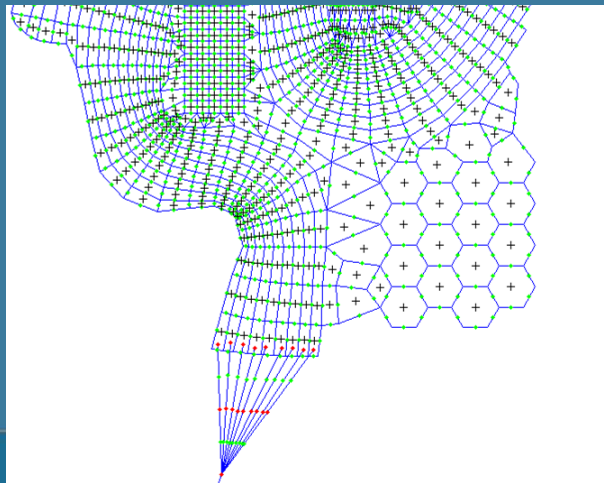
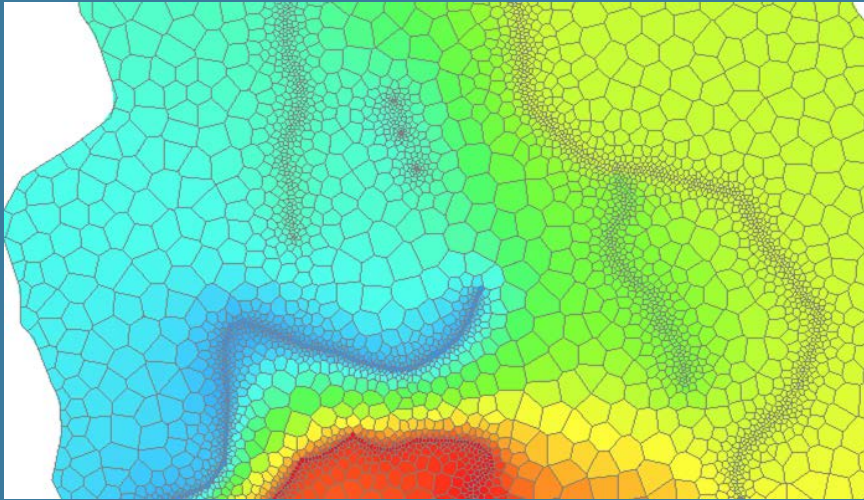
```
url = ('http://geoport.whoi.edu/thredds/dodsC/clay/usgs/users/')
```

Improving Reliability

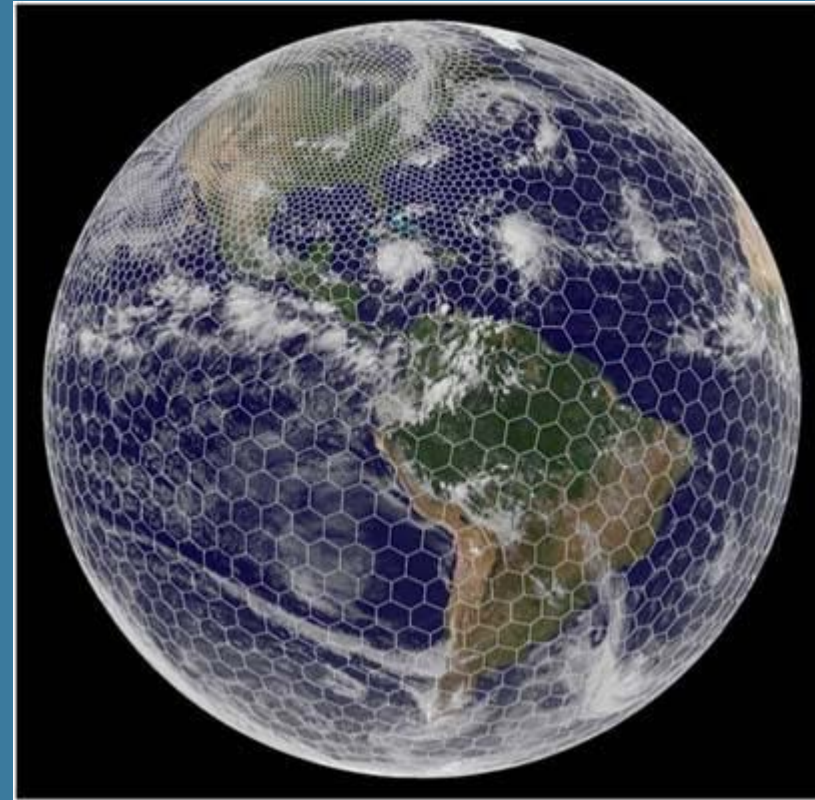
- Monitor services
- Using conda and conda-forge for supporting the IOOS python environment
- Use Docker for deploying services: THREDDS Data Server, ERDDAP, pycsw, sci-wms

Next-Generation Models

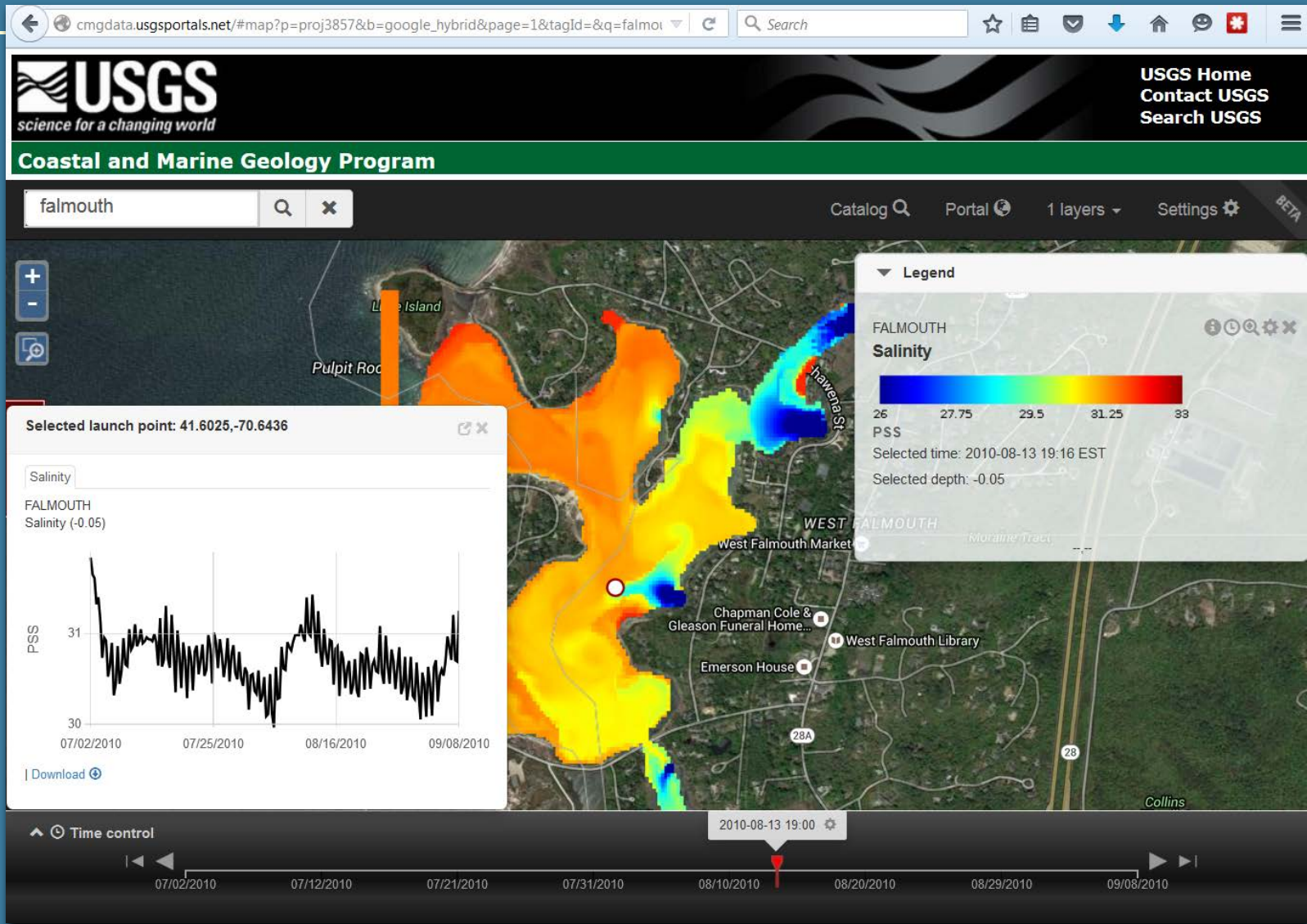
MODFLOW-USG Groundwater Model, USGS, USA



MPAS Global Forecast Model, NCAR/LANL, USA



USGS Model and Time Series Portal



Instructions on IOOS GitHub

← → ↺

GitHub, Inc. [US]

https://github.com/ioos/model-data-framework/wiki

☆

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DOI Apps (T&A)

Terria Map

Inbox (8,522) - rsi

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New Page

Rich Signell edited this page on Mar 14 · 9 revisions

The IOOS Model Data Framework

Background

The IOOS model data framework provides standardized search, access and use of model data. The framework consists of standardized metadata and data services, which could be delivered with a number of different software components, but here we describe one collection of components that work: THREDDS Data Server, pycsw, sci-wms and Anaconda Python Distribution.

Modeling Group System Administrators

System administrators should install this collection of free software packages that will provide standardized data, image and catalog services used by the tools described in the section below.

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[pycsw](#)

[sci wms](#)

[Setup at USGS CMG Woods Hole](#)

[THREDDS Data Server](#)

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https://github.com/ioos/mod



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