

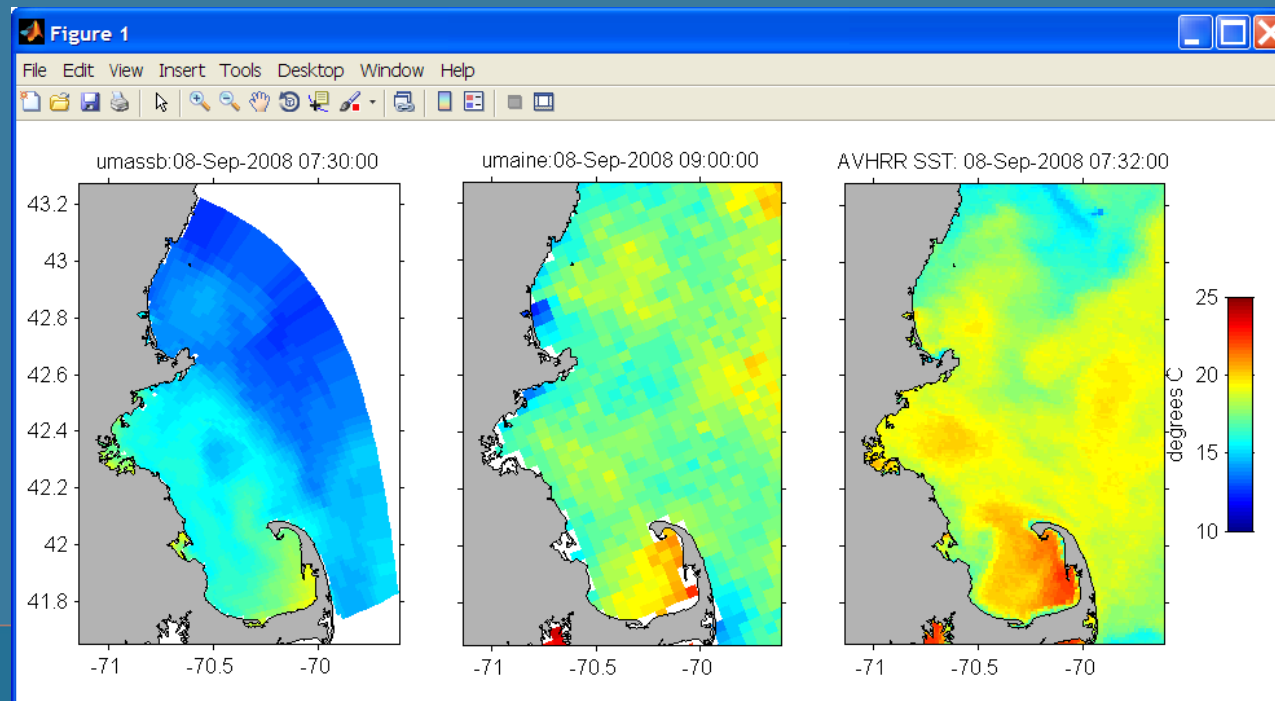
Ocean, Atmosphere & Climate Model Assessment for Everyone

Rich Signell

USGS Woods Hole, MA

Unidata 2014 DeSouza Award Presentation

Boulder, CO : Sep 15, 2014





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NetCDF: A Public-Domain-Software Solution to Data-Access Problems for Numerical Modelers

by **Harry L. Jenter** and **Richard P. Signell**

pp. 72-82

[Purchase Information](#)
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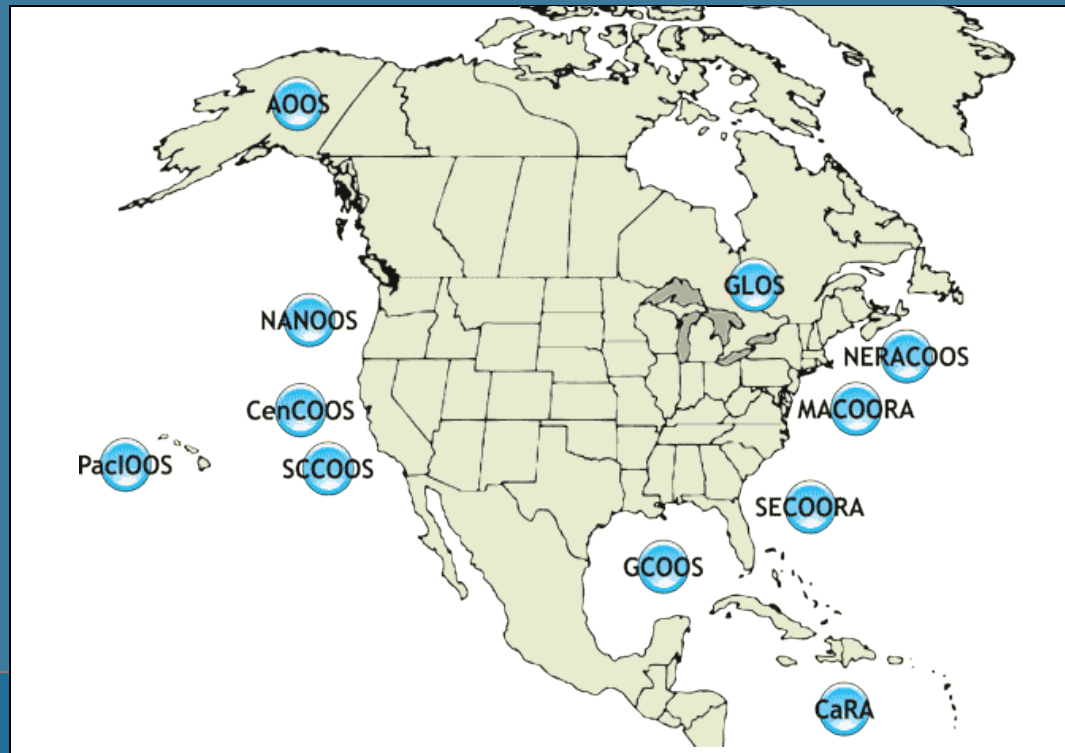
Document type: Conference Proceeding Paper
Part of: Estuarine and Coastal Modeling (1991)

- ASCE Subject Headings:**
- Computer software
 - Data processing
 - Databases

US Integrated Ocean Observing System (IOOS[®])

IOOS[®] Plan defines:

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



How well do models simulate events?



Hurricane Sandy, Ocean Grove Pier -
New Jersey, October 29, 2012 -
Photograph by Bob Bowné

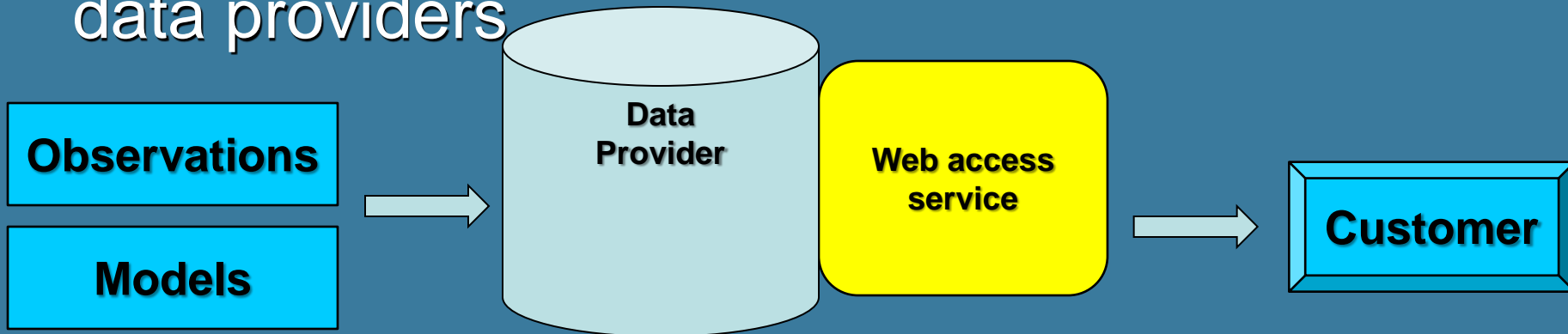
Deepwater Horizon Oil Spill, Northern
Gulf of Mexico, May 24, 2010. Image
from MODIS on NASA's Terra Satellite.

IOOS Core Principles

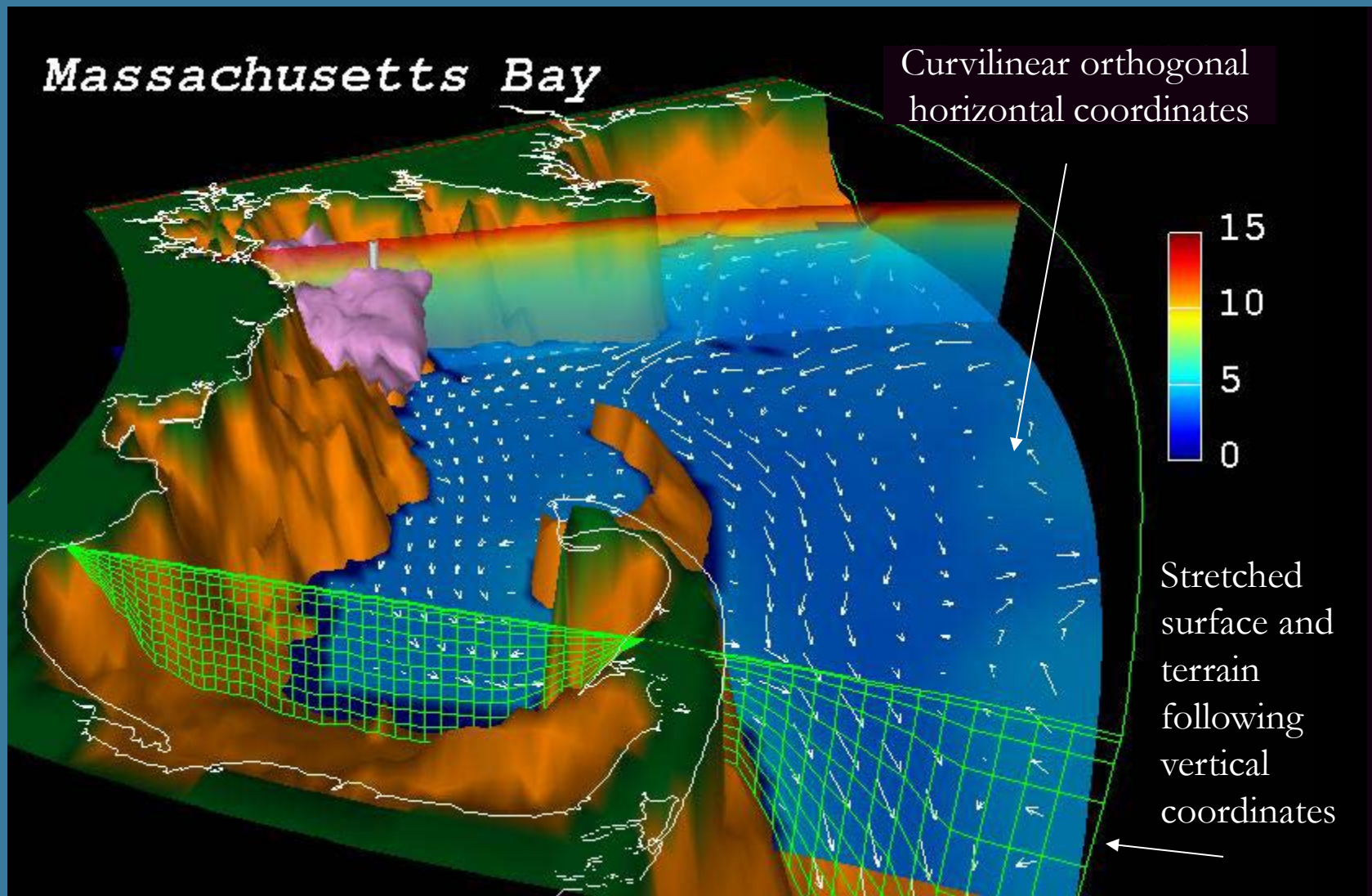
- Adopt open standards & practices



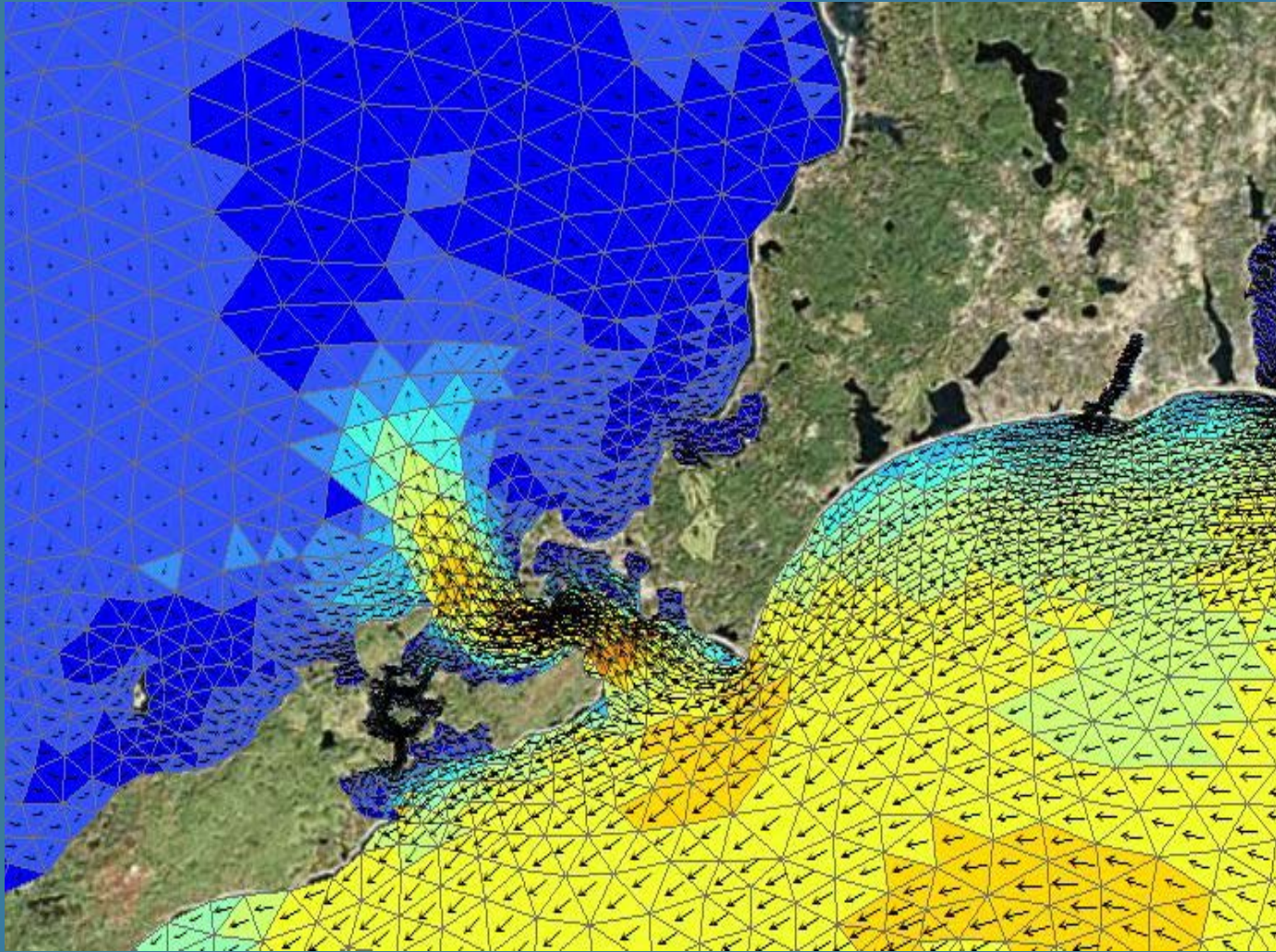
- Avoid customer-specific stovepipes
- Standardized access services implemented at data providers



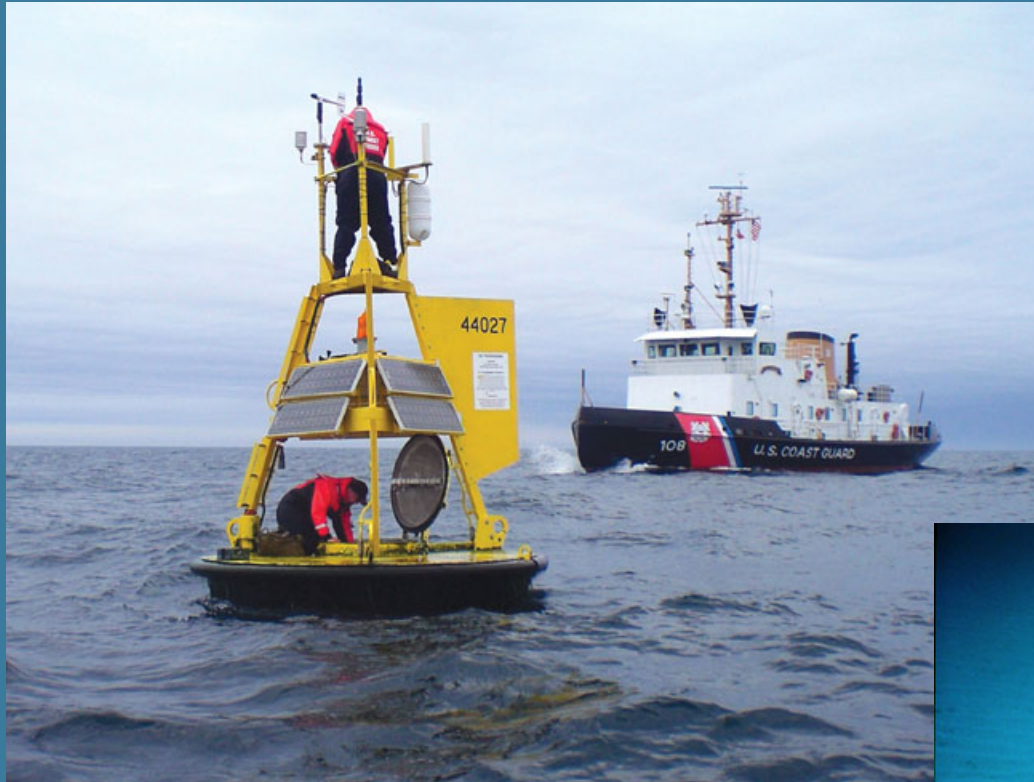
Issue: Ocean grids are not regularly spaced!



Unstructured (e.g. triangular) grid



Time Series, Trajectories



Meteorology and Wave Buoy in the Gulf of Maine. Image courtesy of NOAA.

Ocean Glider. Photo by Dave Fratantoni, Woods Hole Oceanographic Institution



NetCDF Climate and Forecast (CF) Conventions provide a solution

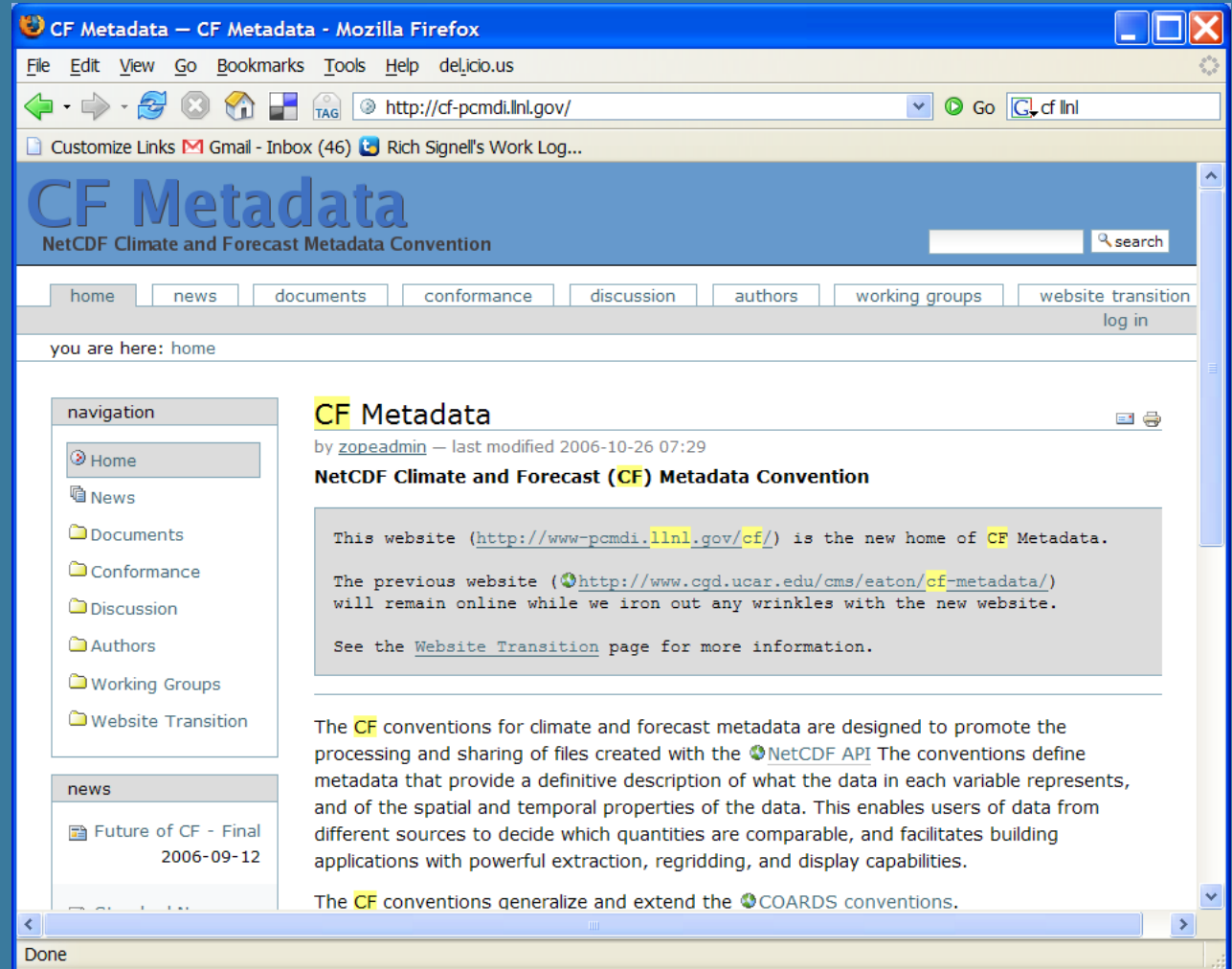
Groups using CF:

GO-ESSP: Global Organization for Earth System Science Portal

IOOS: Integrated Ocean Observing System

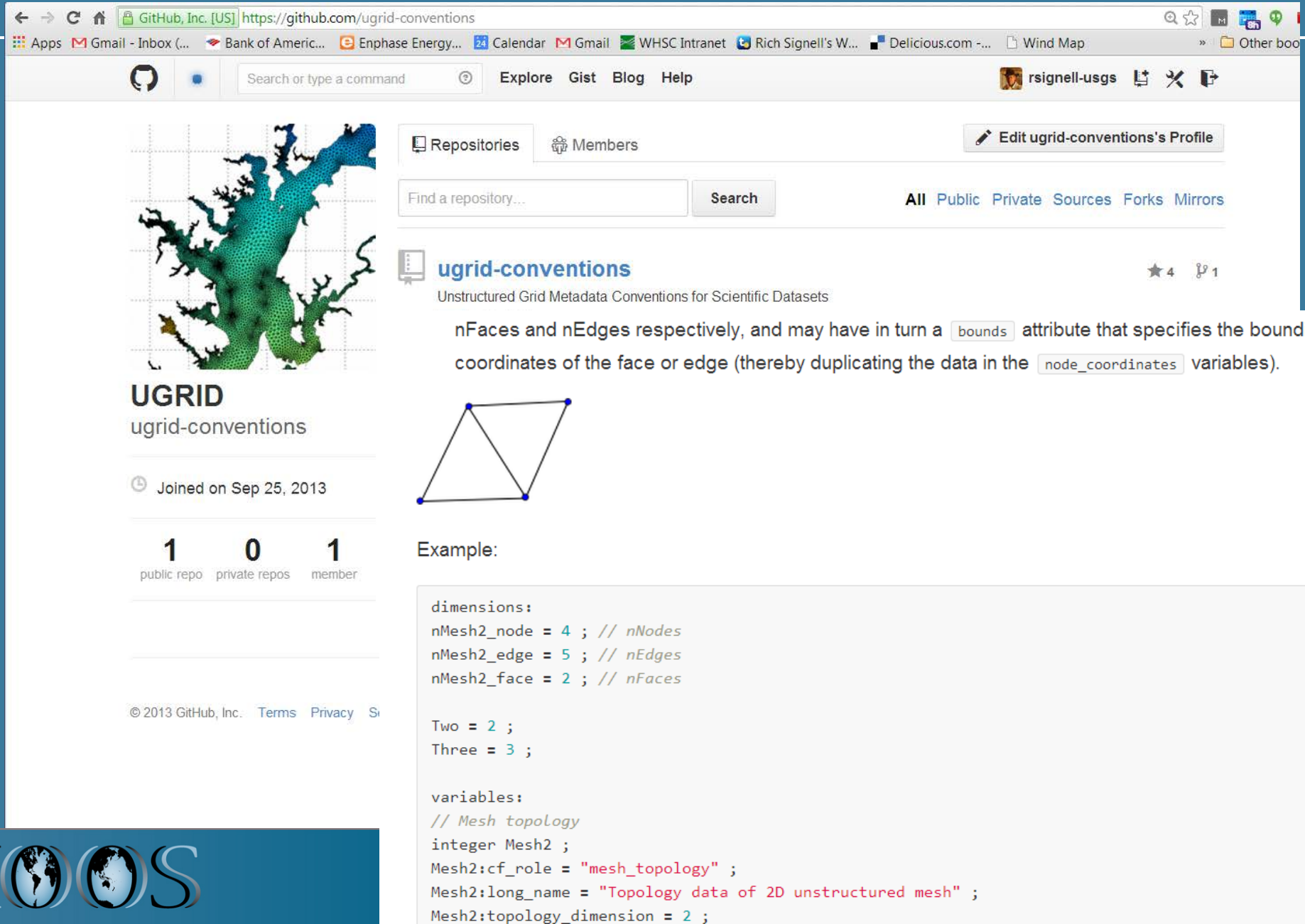
ESMF: Earth System Modeling Framework

OGC: Open Geospatial Consortium (GALEON: WCS profile)



The screenshot shows a Mozilla Firefox browser window displaying the CF Metadata website. The address bar shows the URL <http://cf-pcmdi.llnl.gov/>. The page title is "CF Metadata - CF Metadata - Mozilla Firefox". The website header includes the title "CF Metadata" and the subtitle "NetCDF Climate and Forecast Metadata Convention". A search bar is visible on the right. The navigation menu includes links for "home", "news", "documents", "conformance", "discussion", "authors", "working groups", and "website transition". A "log in" link is also present. The main content area features a "CF Metadata" heading, a byline "by zopeadmin — last modified 2006-10-26 07:29", and the title "NetCDF Climate and Forecast (CF) Metadata Convention". A text box contains the following information: "This website (<http://www-pcmdi.llnl.gov/cf/>) is the new home of CF Metadata. The previous website (<http://www.cgd.ucar.edu/cms/eaton/cf-metadata/>) will remain online while we iron out any wrinkles with the new website. See the [Website Transition](#) page for more information." Below this, a paragraph explains that the CF conventions are designed to promote the processing and sharing of files created with the NetCDF API, defining metadata for data representation and enabling users to decide which quantities are comparable. A final paragraph states that the CF conventions generalize and extend the COARDS conventions. The browser's status bar at the bottom shows "Done".

UGRID Conventions on GitHub



The screenshot shows the GitHub repository page for 'ugrid-conventions'. The page features a header with navigation links, a search bar, and a profile section for 'rsignell-usgs'. The main content area displays the repository name 'ugrid-conventions' with a star count of 4 and a fork count of 1. Below this, there is a description: 'Unstructured Grid Metadata Conventions for Scientific Datasets'. A paragraph explains that 'nFaces' and 'nEdges' attributes may have a 'bounds' attribute specifying bounding coordinates. A diagram of a triangle with four vertices is shown. An 'Example:' section contains a code block with metadata definitions for dimensions and variables.

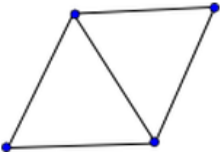
Repositories Members [Edit ugrid-conventions's Profile](#)

Find a repository... Search All Public Private Sources Forks Mirrors

ugrid-conventions ★ 4 🍴 1

Unstructured Grid Metadata Conventions for Scientific Datasets

nFaces and nEdges respectively, and may have in turn a `bounds` attribute that specifies the bounding coordinates of the face or edge (thereby duplicating the data in the `node_coordinates` variables).



Example:

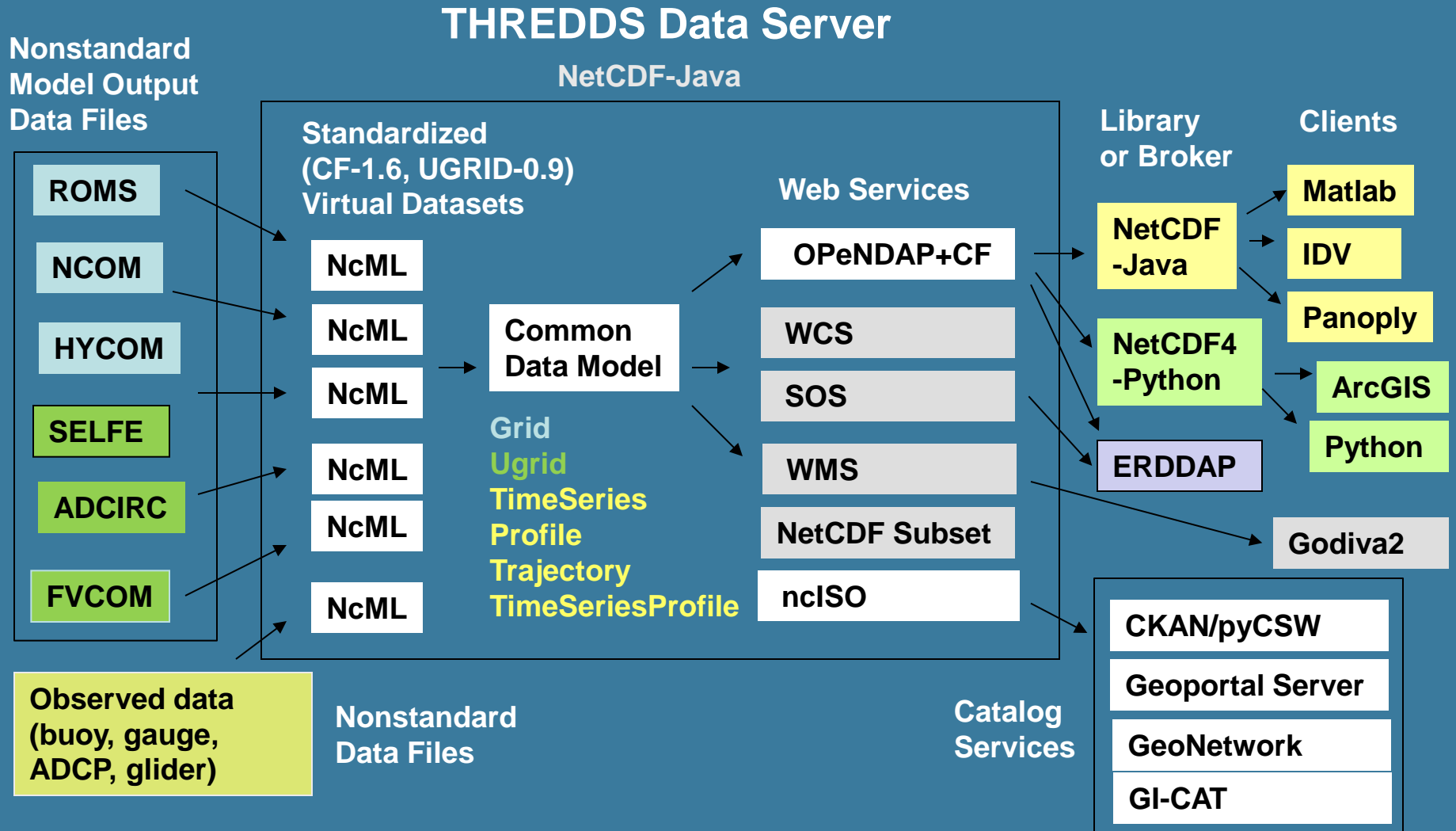
```
dimensions:  
nMesh2_node = 4 ; // nNodes  
nMesh2_edge = 5 ; // nEdges  
nMesh2_face = 2 ; // nFaces  
  
Two = 2 ;  
Three = 3 ;  
  
variables:  
// Mesh topology  
integer Mesh2 ;  
Mesh2:cf_role = "mesh_topology" ;  
Mesh2:long_name = "Topology data of 2D unstructured mesh" ;  
Mesh2:topology_dimension = 2 ;
```

Example NcML (on StackOverflow)

Here's an example:

```
<variable name="v" shape="time2 sigma node" type="float">
  <attribute name="standard_name" value="barotropic_northward_sea_water_velocity"/>
  <attribute name="mesh" value="selfe_mesh"/>
  <attribute name="location" value="node"/>
  <attribute name="coordinates" value="y x"/>
  <attribute name="units" value="m/s"/>
</variable>
<aggregation type="union">
  <netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2">
    <aggregation dimName="time" type="joinExisting">
      <scan
        location="/data/ftp/upload/Inundation/vims/selfe_tropical/runs/Rita/3D_varied_ro
        regexp=".*[0-9]{1}_WaterLevel\.nc$"/>
      </aggregation>
    </netcdf>
    <netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2">
      <aggregation dimName="time" type="joinExisting">
        <scan
          location="/data/ftp/upload/Inundation/vims/selfe_tropical/runs/Rita/3D_varied_ro
          regexp=".*[0-9]{1}_SigWaveHeight\.nc$"/>
        </aggregation>
      </netcdf>
    </netcdf>
  </aggregation>
</netcdf>
```


IOOS Model Data Interoperability Design



WMS Browsing with THREDDS/ncWMS

geoport.whoi.edu/thredds/godiva2/godiva2.html?server=http://geoport.whoi.edu/thredds/wms/coawst_

Apps Gmail - Inbox (... Bank of Americ... Enphase Energy... 27 Calendar WHSC Intranet Other bookmarks

Today
Sun Mon Tue Wed Thu Fri Sat
1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
Select date

5
3.333
boxfill
linear
auto
lock
1.667
0

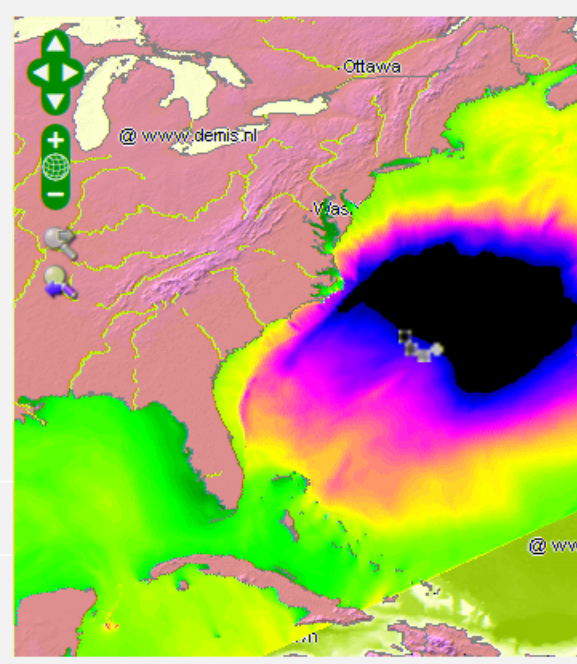
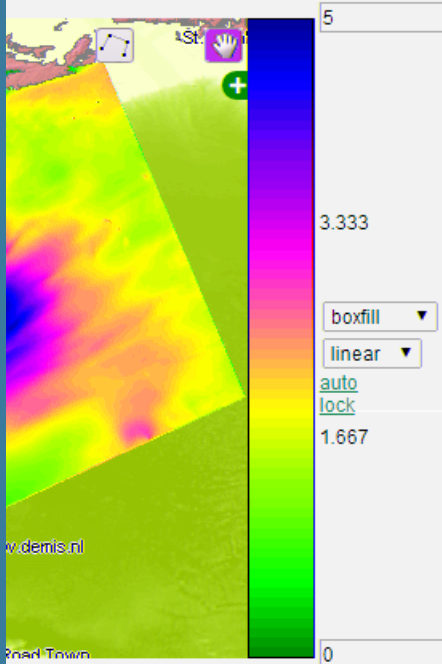
Layer: WHCMSC Sediment Transport Group > COAWST Forecast
Refresh

- wind-induced, bottom v-momentum stress
- wind-induced, bottom v-momentum stress
- max wave and current bottom stress magnitude
- sediment median grain diameter size
- sediment median grain density
- sediment median grain settling velocity
- sediment median critical erosion stress
- bottom ripple length
- bottom ripple height
- bed wave excursion amplitude
- default bottom roughness length
- apparent bottom roughness length
- erosion flux
- erosion or deposition
- sea_surface_wave_significant_height
- wind-induced mean wavelength
- wind-induced wave direction
- wind-induced peak surface wave Period
- wind-induced bottom wave Period
- wind-induced bottom orbital velocity

sea_surface_wave_significant_height
Units: meter

Date/time: 28 Aug 2014 00:00:00 UTC first frame last frame

Fit layer to window



Overlay opacity: 100%

Permalink | email

Reading e-Science Centre

test image Open in Google Earth

Powered by OpenLayers and OGC standards

Matlab NCTOOLBOX

<https://github.com/nctoolbox>

- Objective: Make it simple to access CF data
- Example function:
 - `[t, geo]=nj_tslice(URL,'temp',1);`
 - `t = 22x120x180 single`
 - `geo =`
 - `lat: [120x180 single]`
 - `lon: [120x180 single]`
 - `z: [22x120x180 double]`
 - `time: 733582 (matlab datenum)`
- `nj_tslice` works identically for ROMS, POM, ECOM, WRF, Wavewatch3
- URL can be: local NetCDF, remote NetCDF, NcML, OpenDAP Data URL

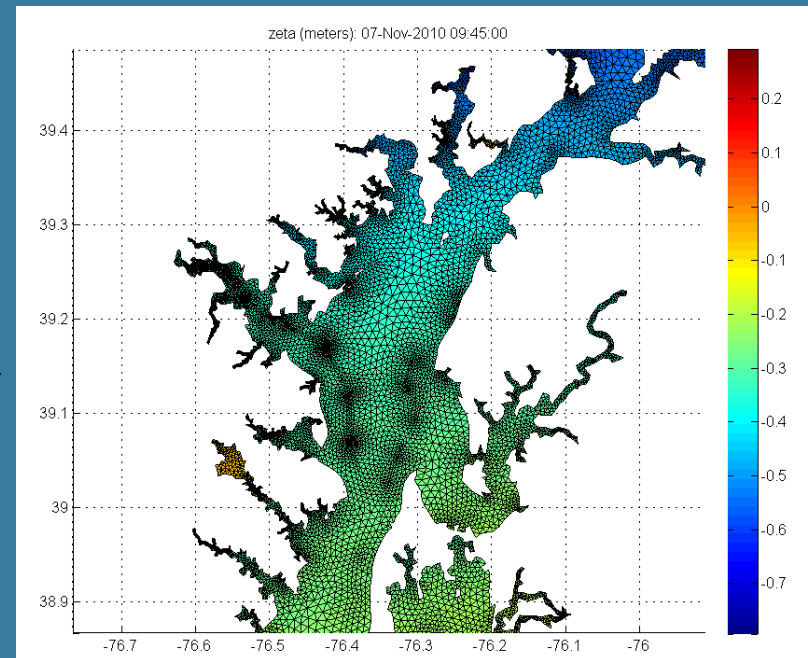
Matlab NCTOOLBOX

<https://github.com/nctoolbox>

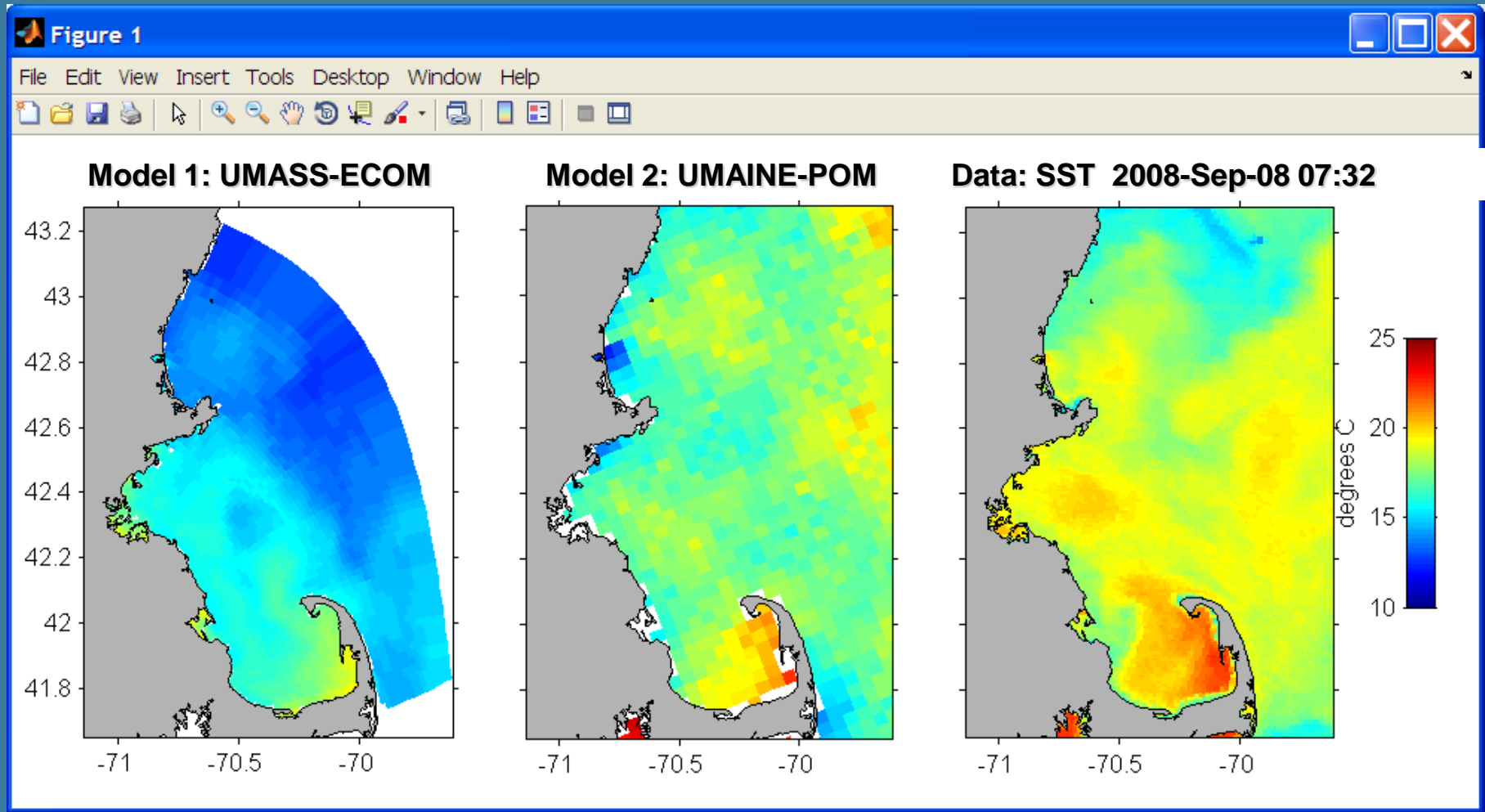
```
nc = ncugrid(dap_url)
ncvar = nc.uvariable('zeta')
z = ncvar.data(itime,:)
grid = ncvar.grid(itime,:)
```

```
z = 26441x1 single
grid =
```

```
lat: [26441x1 single]
lon: [26441x1 single]
time: 730970 (matlab datenum)
connectivity: [52025x3 int32]
```

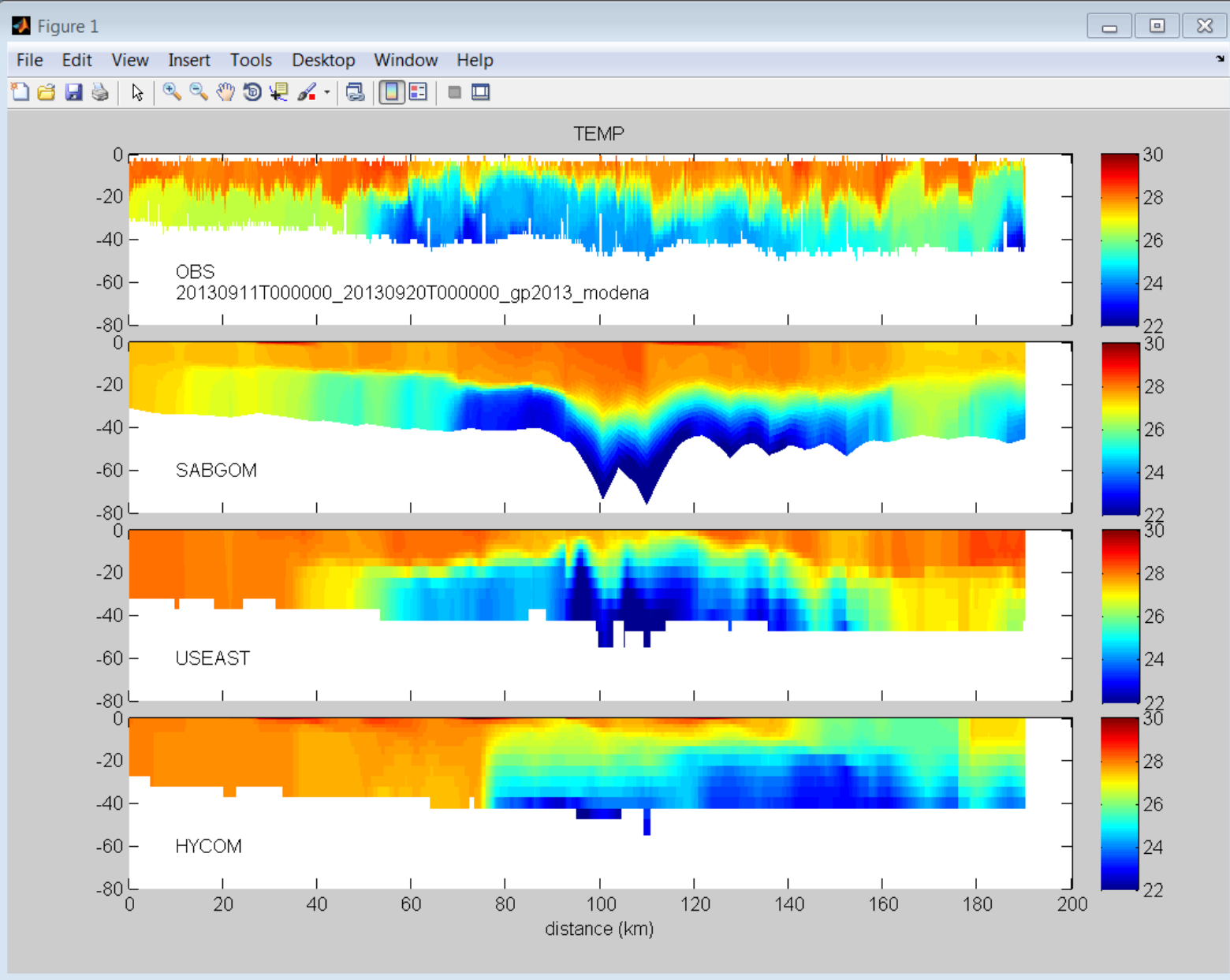


Comparing Models with Data in Matlab



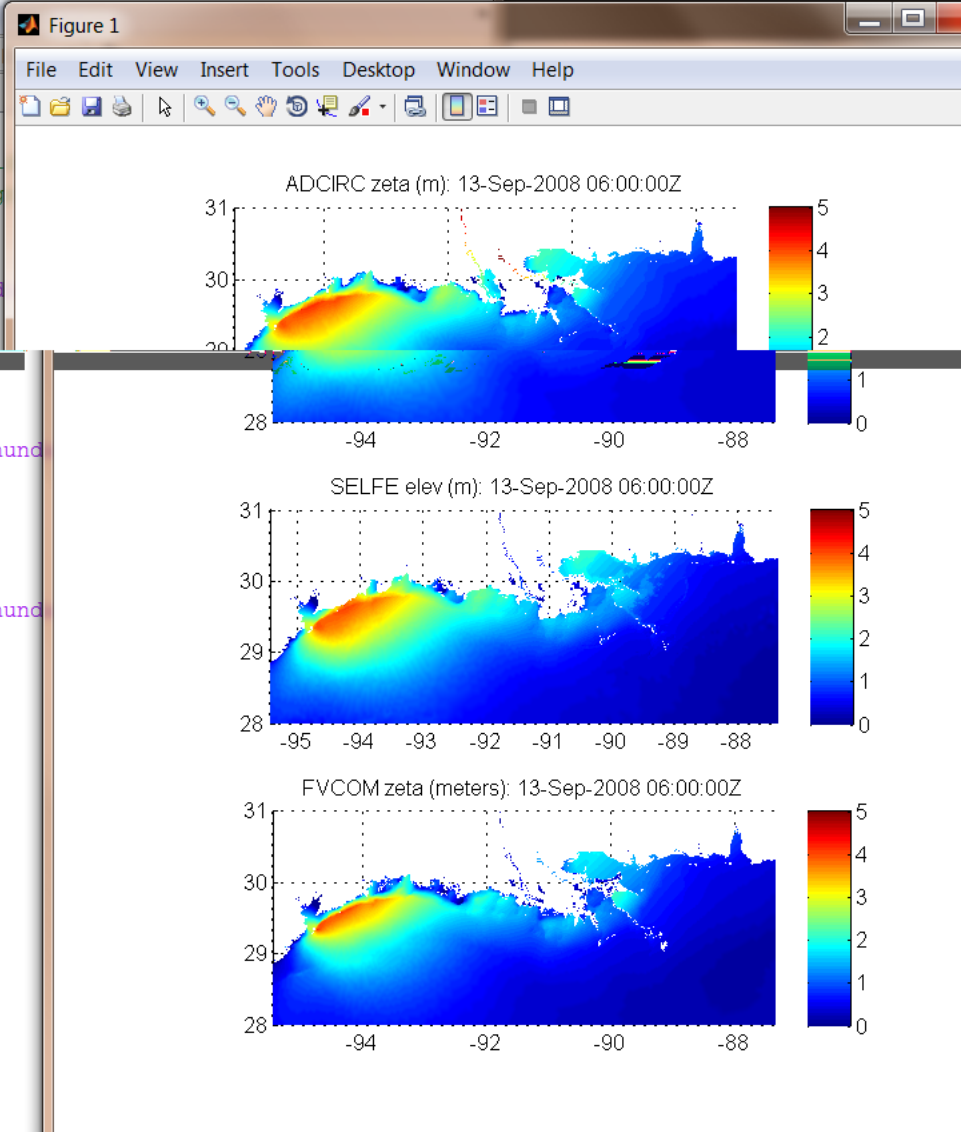
Skidaway modena glider (Sep 11-23)

compare_secoora_model_sections.m (using nc_genslice.m)

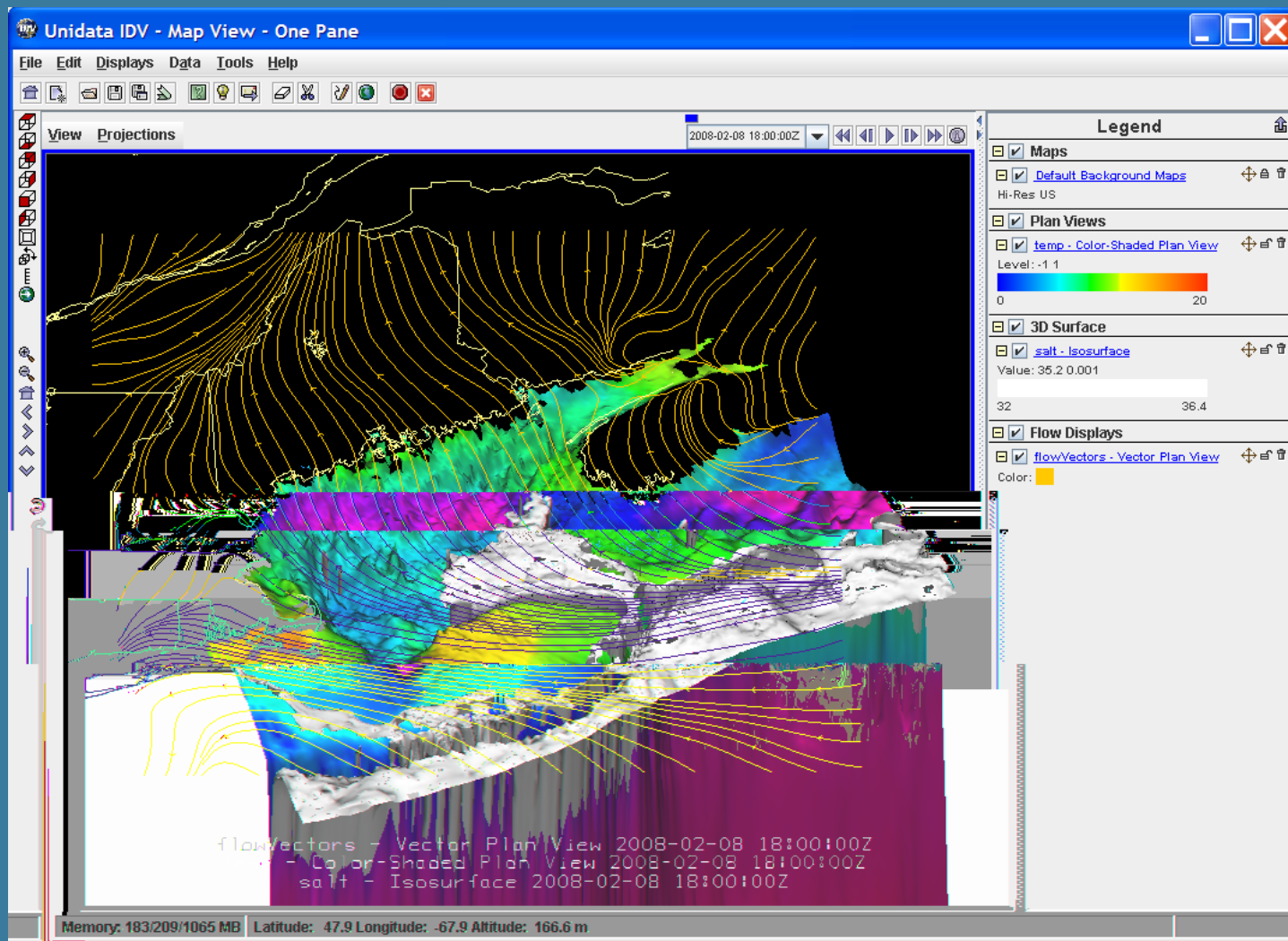


test_cf_ugrid3.m

```
C:\cygwin\home\rsignell\distro\nctoolbox\demos\contrib\test_cf_ugrid3.m
File Edit Text Go Cell Tools Debug Desktop Window Help
+ Stack
- 1.0 + 1.1 x
1 % TEST_CF_UGRID3
2 % Compare water levels from 3 different unstructured grid
3 % models that use UGRID conventions (http://bit.ly/cf_ug
4 % comparison with no model specific code
5 titl{1}='ADCIRC';
6 uris{1}='http://testbedapps.sura.org/thredds/dodsC/inund
7 vars{1}='zeta';
8 times{1}=[2008 9 13 06 00 00];
9
10 titl{2}='SELFE';
11 uris{2}='http://testbedapps.sura.org/thredds/dodsC/inund
12 vars{2}='elev';
13 times{2}=[2008 9 13 06 00 00];
14
15 titl{3}='FVCOM';
16 uris{3}='http://testbedapps.sura.org/thredds/dodsC/inund
17 vars{3}='zeta';
18 times{3}=[2008 9 13 06 00 00];
19 % bounding box for figures
20 ax=[-95.4519 -87.3856 28.0 31.0]
21 % color range for figures
22 cax=[0 5];
23
24 % There is nothing model specific in the loop below!
25 for i=1:length(uris)
26 tic
27 % Initialize dataset object
28 nc=ncgeodataset(uris{i});
29 %get geovvariable object
30 zvar=nc.geovvariable(vars{i});
31 % Find the coordinate variables
32 lon=zvar.getlndata(:);
```



3D visualization of data with IDV



NetCDF Subset Service to CSV



[WHCMSC Sediment Transport Group](#)

[THREDDS Data Server](#)

Catalog http://geoport.who.edu/thredds/catalog/coawst_4/use/fmrc/catalog.html

Dataset: [coawst_4_use/Best Time Series](#)

- *Data format:* netCDF
- *Data type:* GRID
- *Naming Authority:* gov.usgs.er.whsc
- *ID:* coawst_4/use/fmrc/coawst_4_use_best.ncd

Documentation:

- **summary:** Best time series, taking the data from the most recent run available.
- **summary:** ROMS USE Output from COAWST
- [Carolinan Coastal Change Program](#)
- [ReadMe.txt](#)

Access:

1. **OPENDAP:** [/thredds/dodsC/coawst_4/use/fmrc/coawst_4_use_best.ncd](#)
2. **NetcdfSubset:** [/thredds/ncss/grid/coawst_4/use/fmrc/coawst_4_use_best.ncd](#)
3. **WMS:** [/thredds/wms/coawst_4/use/fmrc/coawst_4_use_best.ncd](#)
4. **ISO:** [/thredds/iso/coawst_4/use/fmrc/coawst_4_use_best.ncd](#)
5. **NCML:** [/thredds/ncml/coawst_4/use/fmrc/coawst_4_use_best.ncd](#)
6. **UDDC:** [/thredds/udc/coawst_4/use/fmrc/coawst_4_use_best.ncd](#)



NCSS Grids As Point Data (Gridded Dataset)



Dataset: /thredds/ncss/grid/coawst_4/use/fmrc/coawst_4_use_best.ncd (Gridded Dataset Description)

Base Time: 2012-06-25T01:00:00Z

You must select at least one Variable and a Lat/Lon location.

Select Variable(s):

- angle = angle between XI-axis and EAST
- f = Coriolis parameter at RHO-points
- h = bathymetry at RHO-points
- mask_psi = mask on psi-points
- mask_rho = mask on RHO-points
- mask_u = mask on U-points
- mask_v = mask on V-points
- pm = curvilinear coordinate metric in XI
- pn = curvilinear coordinate metric in ETA

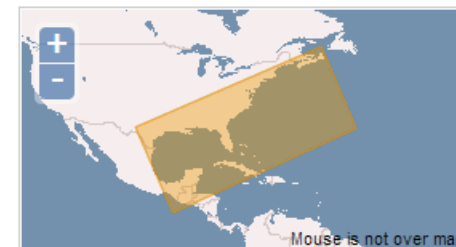
Variables with Time coordinate time

- Dwave = wind-induced wave direction
- Hwave = wind-induced significant wave height
- Lwave = wind-induced mean wavelength
- Pwave_bot = wind-induced bottom wave Period
- Pwave_top = wind-induced peak surface wave Period
- Uwave_rms = wind-induced bottom orbital velocity
- Uwind = surface u-wind component
- Vwind = surface v-wind component
- Zo_app = apparent bottom roughness length
- Zo_def = default bottom roughness length
- bed_wave_amp = bed wave excursion amplitude
- bedload_Usand_01 = bed load flux of sand in U-direction, size class 01
- bedload_Usand_02 = bed load flux of sand in U-direction, size class 02
- bedload_Usand_03 = bed load flux of sand in U-direction, size class 03
- bedload_Usand_04 = bed load flux of sand in U-direction, size class 04

Format: csv

- bedload_Usand_05 = bed load flux of sand in U-direction, size class 05
- bedload_Usand_06 = bed load flux of sand in U-direction, size class 06

Choose Lat/Lon Location:



Latitude:

Longitude:

Within Bounding Box:

north

west east

south

Choose Time Subset:

Time range Single time

Starting:

Ending:

[reset to full extension](#)

Choose Vertical Level:

Level:

Choose Output Format:

CSV Time Series from Subset Service

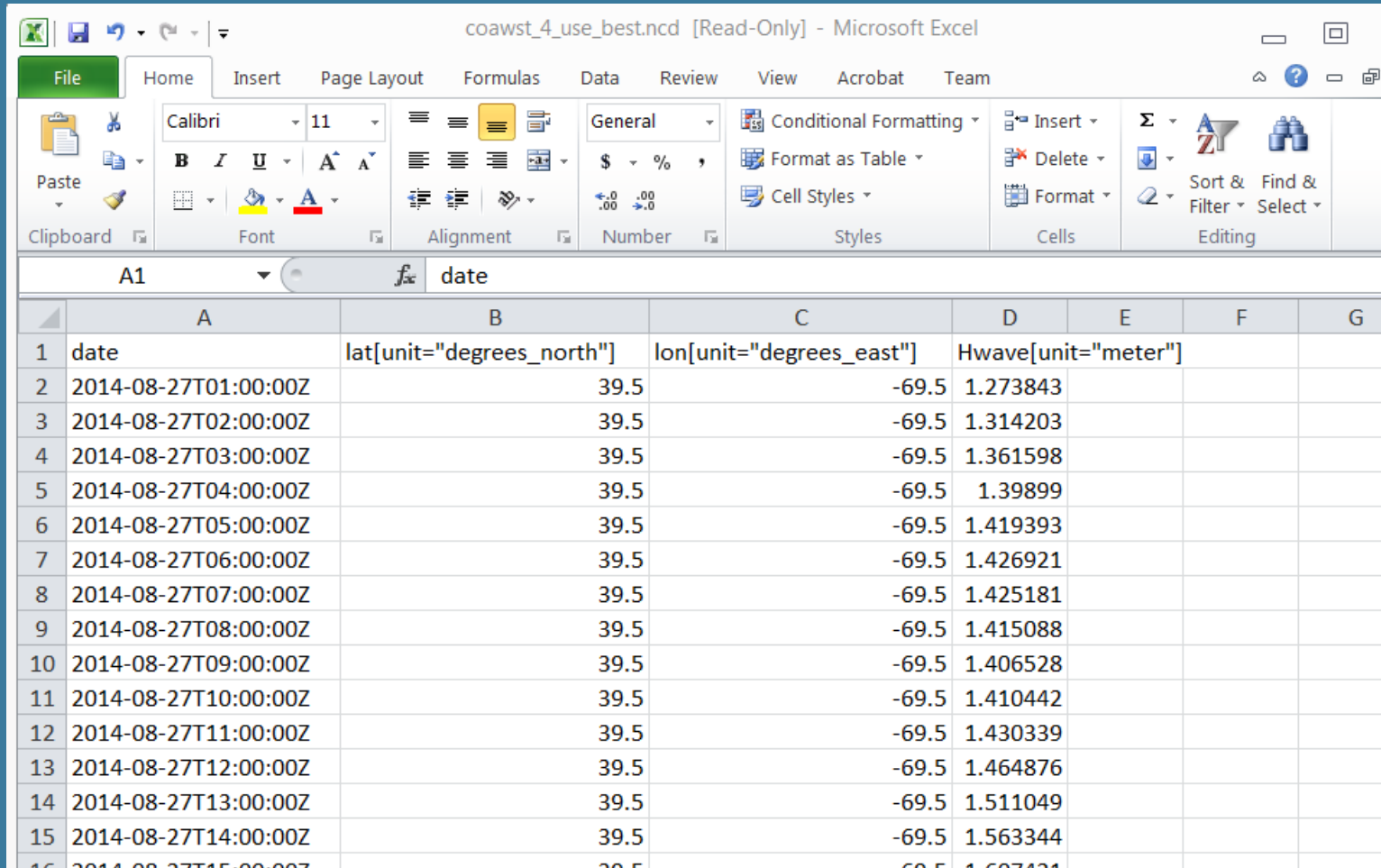
```
date,lat[unit="degrees_north"],lon[unit="degrees_east"],Hwave[unit="meter"]
2014-08-27T01:00:00Z,39.5,-69.5,1.273842692375183
2014-08-27T02:00:00Z,39.5,-69.5,1.3142027854919434
2014-08-27T03:00:00Z,39.5,-69.5,1.3615976572036743
2014-08-27T04:00:00Z,39.5,-69.5,1.398990273475647
2014-08-27T05:00:00Z,39.5,-69.5,1.419392704963684
2014-08-27T06:00:00Z,39.5,-69.5,1.426921010017395
2014-08-27T07:00:00Z,39.5,-69.5,1.4251813888549805
2014-08-27T08:00:00Z,39.5,-69.5,1.4150882959365845
2014-08-27T09:00:00Z,39.5,-69.5,1.406528115272522
2014-08-27T10:00:00Z,39.5,-69.5,1.4104422330856323
2014-08-27T11:00:00Z,39.5,-69.5,1.4303393363952637
2014-08-27T12:00:00Z,39.5,-69.5,1.4648756980895996
2014-08-27T13:00:00Z,39.5,-69.5,1.5110485553741455
2014-08-27T14:00:00Z,39.5,-69.5,1.5633442401885986
2014-08-27T15:00:00Z,39.5,-69.5,1.6074210405349731
2014-08-27T16:00:00Z,39.5,-69.5,1.6265686750411987
2014-08-27T17:00:00Z,39.5,-69.5,1.6184144020080566
2014-08-27T18:00:00Z,39.5,-69.5,1.5933209657669067
2014-08-27T19:00:00Z,39.5,-69.5,1.5608850717544556
2014-08-27T20:00:00Z,39.5,-69.5,1.527510643005371
2014-08-27T21:00:00Z,39.5,-69.5,1.5050616264343262
2014-08-27T22:00:00Z,39.5,-69.5,1.5094025135040283
2014-08-27T23:00:00Z,39.5,-69.5,1.5698728561401367
2014-08-28T00:00:00Z,39.5,-69.5,1.7087903022766113
```

CSV request is a “RESTful” URL:

http://geoport.who.edu/thredds/ncss/grid/coawst_4/use/fmrc/coawst_4_use_best.ncd?var=Hwave&latitude=39.5&longitude=-69.5&time_start=2014-08-27T01:00:00Z&time_end=2014-08-28T00:00:00Z&vertCoord=&accept=csv



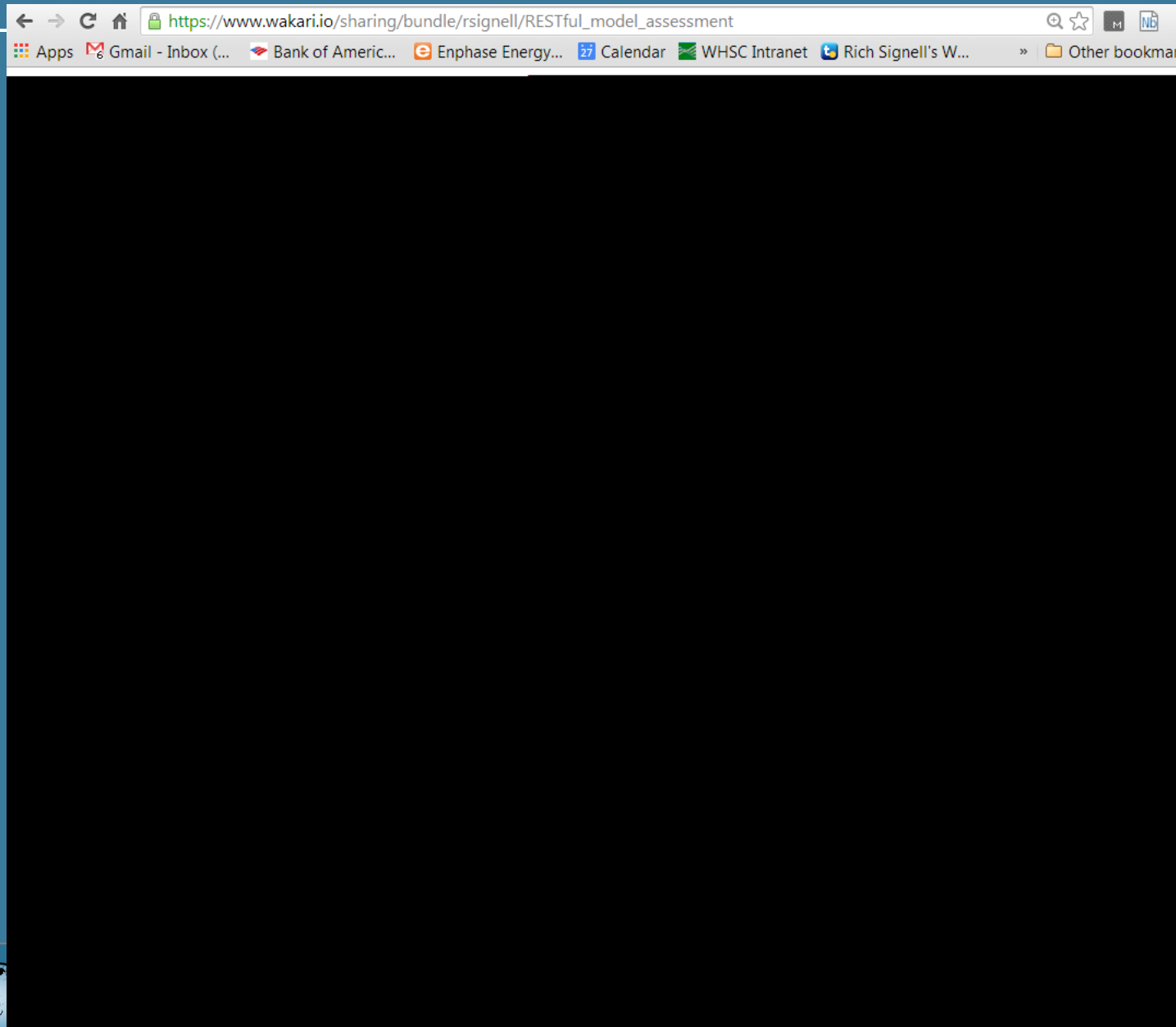
Accessing the CSV data in Excel



The screenshot shows the Microsoft Excel interface with the following data table:

	A	B	C	D	E	F	G
1	date	lat[unit="degrees_north"]	lon[unit="degrees_east"]	Hwave[unit="meter"]			
2	2014-08-27T01:00:00Z	39.5	-69.5	1.273843			
3	2014-08-27T02:00:00Z	39.5	-69.5	1.314203			
4	2014-08-27T03:00:00Z	39.5	-69.5	1.361598			
5	2014-08-27T04:00:00Z	39.5	-69.5	1.39899			
6	2014-08-27T05:00:00Z	39.5	-69.5	1.419393			
7	2014-08-27T06:00:00Z	39.5	-69.5	1.426921			
8	2014-08-27T07:00:00Z	39.5	-69.5	1.425181			
9	2014-08-27T08:00:00Z	39.5	-69.5	1.415088			
10	2014-08-27T09:00:00Z	39.5	-69.5	1.406528			
11	2014-08-27T10:00:00Z	39.5	-69.5	1.410442			
12	2014-08-27T11:00:00Z	39.5	-69.5	1.430339			
13	2014-08-27T12:00:00Z	39.5	-69.5	1.464876			
14	2014-08-27T13:00:00Z	39.5	-69.5	1.511049			
15	2014-08-27T14:00:00Z	39.5	-69.5	1.563344			
16	2014-08-27T15:00:00Z	39.5	-69.5	1.607431			

Access the CSV data in Python, R, etc



File Edit View Insert Cell Kernel Help

Code Cell Toolbar: None

```
In [12]: # DAP URL: 30 year East Coast wave hindcast (Wave Watch 3 driven by CFSR Winds)
cubes = iris.load('http://geoport.whoi.edu/thredds/dodsC/fmrc/NCEP/ww3/cfsr/4m/best');
```

```
In [13]: print cubes
```

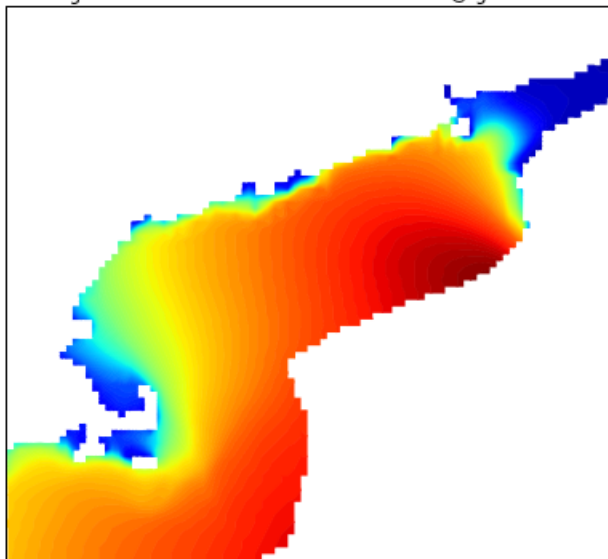
```
0: Significant height of combined wind waves and swell @ Ground or water surface / m (time: 90584; latitude: 481; longitude: 586)
1: u-component of wind @ Ground or water surface / m/s (time: 90096; latitude: 481; longitude: 586)
2: v-component of wind @ Ground or water surface / m/s (time: 90096; latitude: 481; longitude: 586)
3: Primary wave direction (degree true) @ Ground or water surface / unknown (time: 90584; latitude: 481; longitude: 586)
4: Primary wave mean period @ Ground or water surface / s (time: 90584; latitude: 481; longitude: 586)
```

```
In [14]: hsig=cubes[0]
```

```
In [15]: slice=hsig.extract(iris.Constraint(time=tval(hsig,'1989-05-07 21:00'),
longitude=lambda cell: -71.5 < cell < -65.0,
latitude=lambda cell: 39.5 < cell < 46.0))
```

```
In [16]: # make the plot
figure(figsize=(10,10))
qplt.contourf(slice,100);
```

Significant height of combined wind waves and swell @ ground or wat



scitools.org.uk/iris/

Inbox (... Bank of Americ... Enphase Energy... Gmail 28 Calendar » Other



Code Scitools Home Download Documentation Community Governance

Python and A Python library for Meteorology and Climatology

tion layer which isolates
ita model we have
we have called an Iris

ts, including (CF-
s, such as arithmetic,
tions.

The Iris library implements a data model to create a data abstract
analysis and visualisation code from data format specifics. The da
chosen is the CF Data Model. The implementation of this model v
Cube.

Iris currently supports read/write access to a range of data forma
)netCDF, GRIB, and PP; fundamental data manipulation operation:
interpolation, and statistics; and a range of integrated plotting op

Iris is published under an [LGPLv3](#) licence.

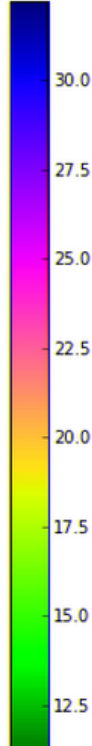
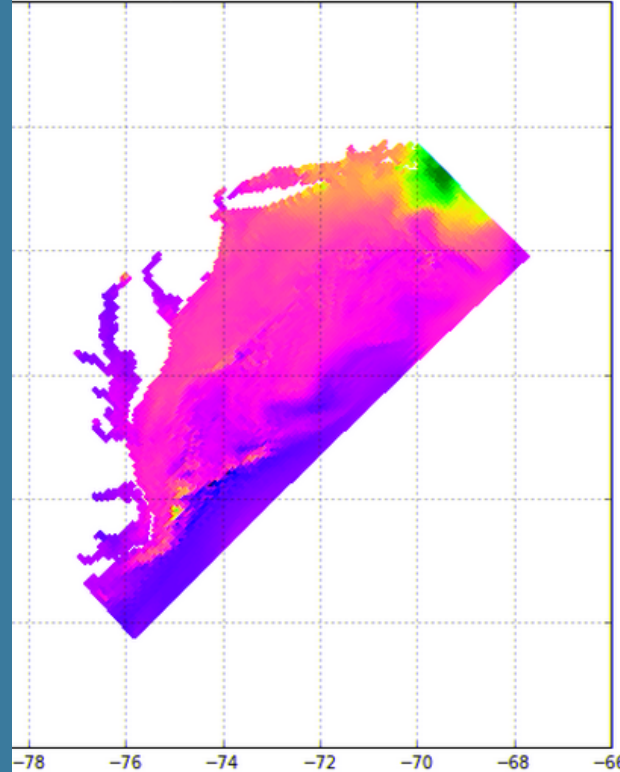


ESPreSSO model (Rutgers)

```
IOOS/ESPRESSO'  
//tds.marine.rutgers.edu/thredds/dodsC/roms/espresso/2013_da/his_Best/ESPRESSO_Real-Time_v2_History_Best_Available_best.ncd'  
water_potential_temperature'  
  
lev_date(url=url,var=var,mytime=mytime,lev=lev)  
plot(lev_date(url=url,var=var,mytime=mytime,lev=lev),model=model)  
  
Retrieved in 1.875781 seconds
```

```
In [9]: model='MARCO  
url='http:  
var='sea_wa  
lev=-1  
slice=var_  
myplot(slice  
  
slice retr
```

IOOS/ESPRESSO: potential temperature: 2014-08-28 13:00:00



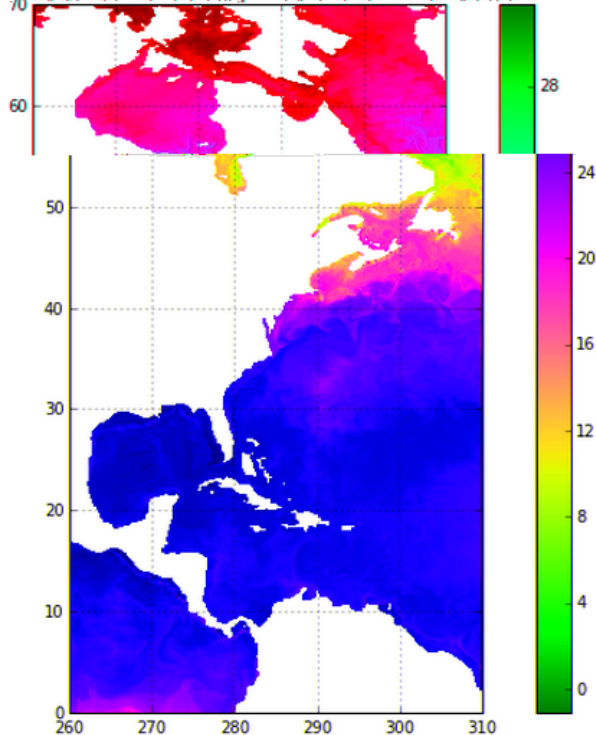
Global RTOFS (NOAA)

```
In [13]: model='Global RTOFS/NCEP'  
url='http://ecowatch.ncddc.noaa.gov/thredds/dodsC/hycom/hycom_reg1_agg/HYCOM_Region_1_Aggregation_best.ncd'  
var='sea_water_temperature'  
lev=1  
subsample=1  
slice=var_lev_date(url=url,var=var, mytime=mytime, lev=lev, subsample=subsample)  
myplot(slice,model=model)
```

slice retrieved in 1.225454 seconds

```
/opt/anaconda/envs/np18py27-1.9/lib/python2.7/site-packages/iris/fileformats/_pyke_rules/compiled_krb/fc_rules_cf_fc.py:1196: UserWarning: Ignoring netCDF variable 'salinity' invalid units 'psu'  
warnings.warn(msg.format(msg_name, msg_units))
```

Global RTOFS/NCEP: Water temperature: 2014-08-28 12:00:00



IOOS Models Notebook on Wakari

← → ↻ 🏠 https://www.wakari.io/sharing/bundle/rsignell/IOOS_Models

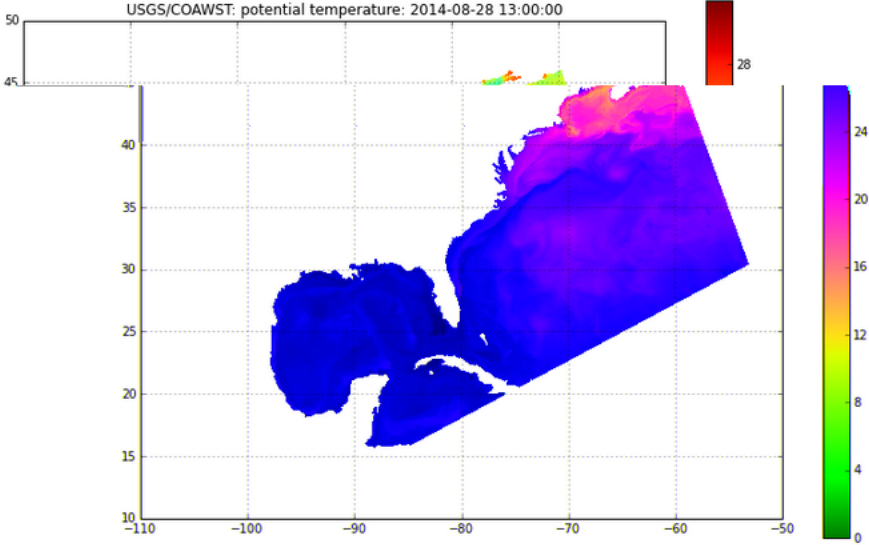
📱 Apps 📧 Gmail - Inbox (...) 🏦 Bank of Americ... ⚡ Enphase Energy... 📅 Calendar 🌐 WHSC Intranet 🗣️ Rich Signell's W... 👍 Emoji cheat she... 👍 Emoji ch

Wakari IOOS_Models

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slice retrieved in 4.816941 seconds

USGS/COAWST: potential temperature: 2014-08-28 13:00:00

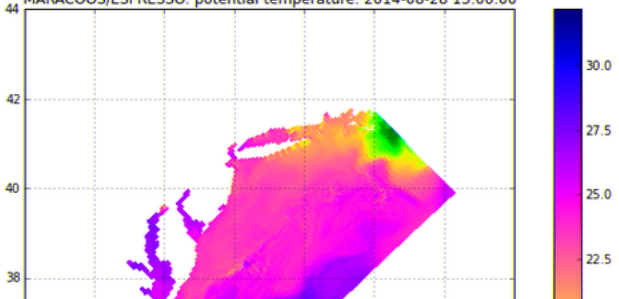


In [9]:

```
model='MARACOOS/ESPRESSO'
url='http://tds.marine.rutgers.edu/thredds/dodsC/roms/esspresso/2013_da/his_Best/ESPRESSO_Real-Time_v2_History_Best_Available_best.nc'
var='sea_water_potential_temperature'
lev=-1
slice=var_lev_date(url=url,var=var, mytime=mytime, lev=lev)
myplot(slice,model=model)
```

slice retrieved in 1.875781 seconds

MARACOOS/ESPRESSO: potential temperature: 2014-08-28 13:00:00



IOOS

60 minutes to serving your data

1. Install Sun/Oracle Java (10 min)
2. Install/configure Tomcat (15 min)
3. Install/configure the Thredds Data Server (15 min)
4. Put NetCDF (or HDF4, Grib1, Grib2, HDF5 files) in a directory (5 min)
5. Add NcML (XML) files for CF compliance and aggregation (15 min)

Adding data to THREDDS

```
rsgnell@gam:/usgs/data0/bbleh/tidal$ ls *wide*
```

```
...
```

```
his_bbleh_wide_0048.nc his_bbleh_wide_0100.nc his_bbleh_wide_0152.nc  
his_bbleh_wide_0049.nc his_bbleh_wide_0101.nc his_bbleh_wide_0153.nc  
his_bbleh_wide_0050.nc his_bbleh_wide_0102.nc his_bbleh_wide_0154.nc  
his_bbleh_wide_0051.nc his_bbleh_wide_0103.nc wide.ncml
```

```
$more wide.ncml
```

```
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2">  
  <aggregation dimName="ocean_time" type="joinExisting">  
    <scan location="." regExp=".*wide.*_[0-9]{4}\.nc$"/>  
  </aggregation>  
</netcdf>
```



alog.html **Catalog** <http://geoport.whoi.edu/thredds/catalog/usgs/data0/bbleh/tidal/cat>

Dataset: tidal/wide.ncml

- *Data size:* 218.0 bytes
- *ID:* usgs/data0/bbleh/tidal/wide.ncml

Access:

1. **OPENDAP:** </thredds/dodsC/usgs/data0/bbleh/tidal/wide.ncml>
2. **HTTPServer:** </thredds/fileServer/usgs/data0/bbleh/tidal/wide.ncml>
3. **NetcdfSubset:** </thredds/ncss/grid/usgs/data0/bbleh/tidal/wide.ncml>
4. **ISO:** </thredds/iso/usgs/data0/bbleh/tidal/wide.ncml>
5. **NCML:** </thredds/ncml/usgs/data0/bbleh/tidal/wide.ncml>
6. **UDDC:** </thredds/uddc/usgs/data0/bbleh/tidal/wide.ncml>
7. **WMS:** </thredds/wms/usgs/data0/bbleh/tidal/wide.ncml>

Dates:

- 2014-06-03T12:44:05Z (**modified**)

Viewers:

- [Godiva2 \(browser-based\)](#)
- [NetCDF-Java ToolsUI \(webstart\)](#)

Browsing WMS with Godiva2

Auto-zoom on select

WHCMSC Sediment Transport Group

- BBLEH ADCIRC tidal forcing
 - wet/dry mask on V-points
 - vertically integrated v-momentum component
 - bathymetry at RHO-points
 - Coriolis parameter at RHO-points
 - curvilinear coordinate metric in XI
 - curvilinear coordinate metric in ETA
 - angle between XI-axis and EAST
 - mask on RHO-points
 - wet/dry mask on RHO-points
 - free-surface
 - wet/dry mask on U-points
 - vertically integrated u-momentum component
 - mask on psi-points
 - mask on V-points
 - mask on U-points

Layer: WHCMSC Sediment Transport Group > BBLEH ADCIRC tidal forcing > free-surface
Units: meter

Date/time: 17 Oct 2012 00:00:00 UTC [first frame](#) [last frame](#)

[Fit layer to window](#)

October, 2012						
Today						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Select date

User guide

Reading

Centre

layer opacity: 100%

[Permalink](#) | [email](#)

[testimage](#)

Powered by [OpenLayers](#) and [OGC](#) standards

Searching for Data

GI-CAT catalog broker service architecture

SEARCH BROWSE

Search

Search metadata content, including title, abstract, and keywords

(WRF OR ROMS OR COAWST) NOT NGDC

Results 1-10 of 34 record(s) >

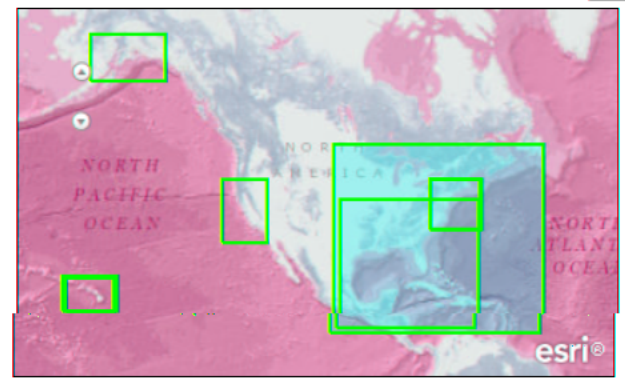
Select site or configure search.

Advanced Search Options

[Clear](#)

WHERE

Anywhere Intersecting Fully within



Expand results [Zoom To Results](#) [Zoom To Searched Area](#)

[COAWST Forecast System : USGS : US East Coast and Gulf of Mexico \(Experimental\)](#)

Experimental forecast model product from the USGS Coupled Ocean Atmosphere Wave Sediment-Transport (COAWST) modeling system. Data required to drive the modeling system include parametric wave parameters derived from Wave Watch III, wind and atmospheric su...

[Open Preview](#) [Details](#) [Metadata](#) [WMS](#) [Download](#)
[OPeNDAP](#) [Zoom To](#)

[ROMS/TOMS 3.0 - South-Atlantic Bight and Gulf of Mexico](#)

[CeNCOOS/Models/ROMS/California ROMS/California Coastal Regional Ocean Modeling System \(ROMS\) Nowcast](#)

[ROMS ESPRESSO Real-Time Operational IS4DVAR Forecast System Version 1 \(OLD\) 2009-2013 History](#)

[ROMS ESPRESSO Real-Time Operational IS4DVAR Forecast System Version 2 \(NEW\) 2013-present FMRC Averages \(Best\)](#)

[ROMS ESPRESSO Real-Time Operational IS4DVAR Forecast System Version 2 \(NEW\) 2013-present FMRC History \(Best\)](#)

javascript:void(0)

IOOS System Test

The screenshot shows a Jupyter Notebook interface with a menu bar (File, Edit, View, Insert, Cell, Kernel, Help) and a toolbar with icons for saving, adding, deleting, copying, pasting, and navigating. The notebook content is split into two columns. The left column has a heading 'Theme: Inundation' and text describing data retrieval for a bounding box and time period. The right column has a heading 'IOOS System Test: Extreme Event' and text comparing modeled water levels with observations. Below the text are two input boxes for bounding box and time range, and a code cell with Python code for date handling.

Theme: Inundation

ons for a specified bounding box and time period
or catalog search (CSW) and data retrieval

Endpoints from model datasets and SOS endpoints from observational datasets
will be granules
atasets (from ncSOS) or collections of datasets (from NDBC, CO-OPS SOS servers)
in datasets
atasets
atasets at locations of observations
on same vertical datum

nd bounding box of interest:

imes (UTC) ...

(2012, 10, 26)
2012, 11, 2)

(2014, 2, 10)
2014, 2, 15)

IOOS System Test: Extreme Event

Compare modeled water levels with observations
using IOOS recommended service standards for
(OPeNDAP & SOS).

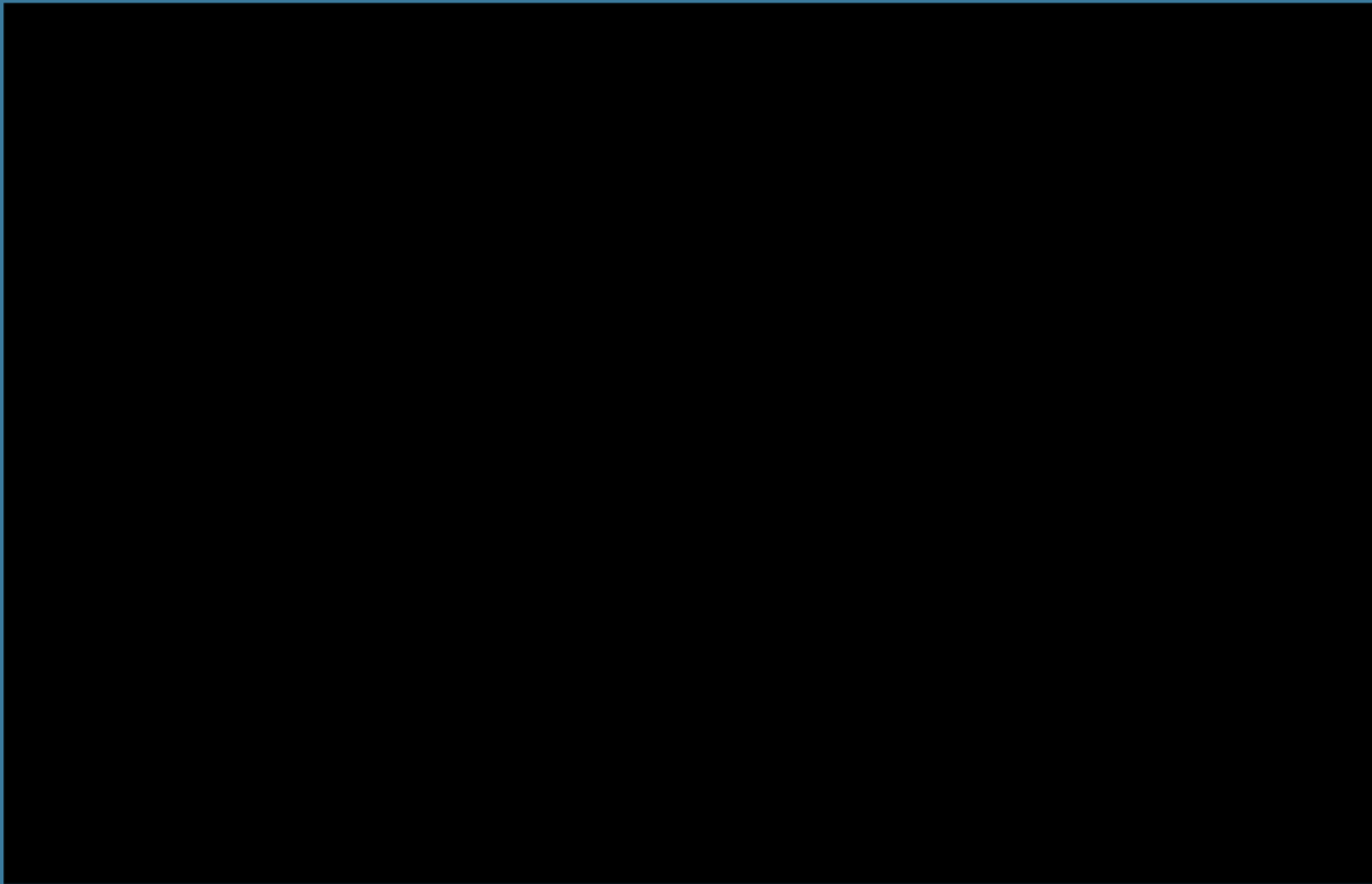
... Query CSW to find datasets that match criteria ...

- Extract OPeNDAP data en
- OPeNDAP model datasets
- SOS endpoints may be da
- Filter SOS services to obta
- Extract data from SOS data
- Extract data from model da
- Compare time series data

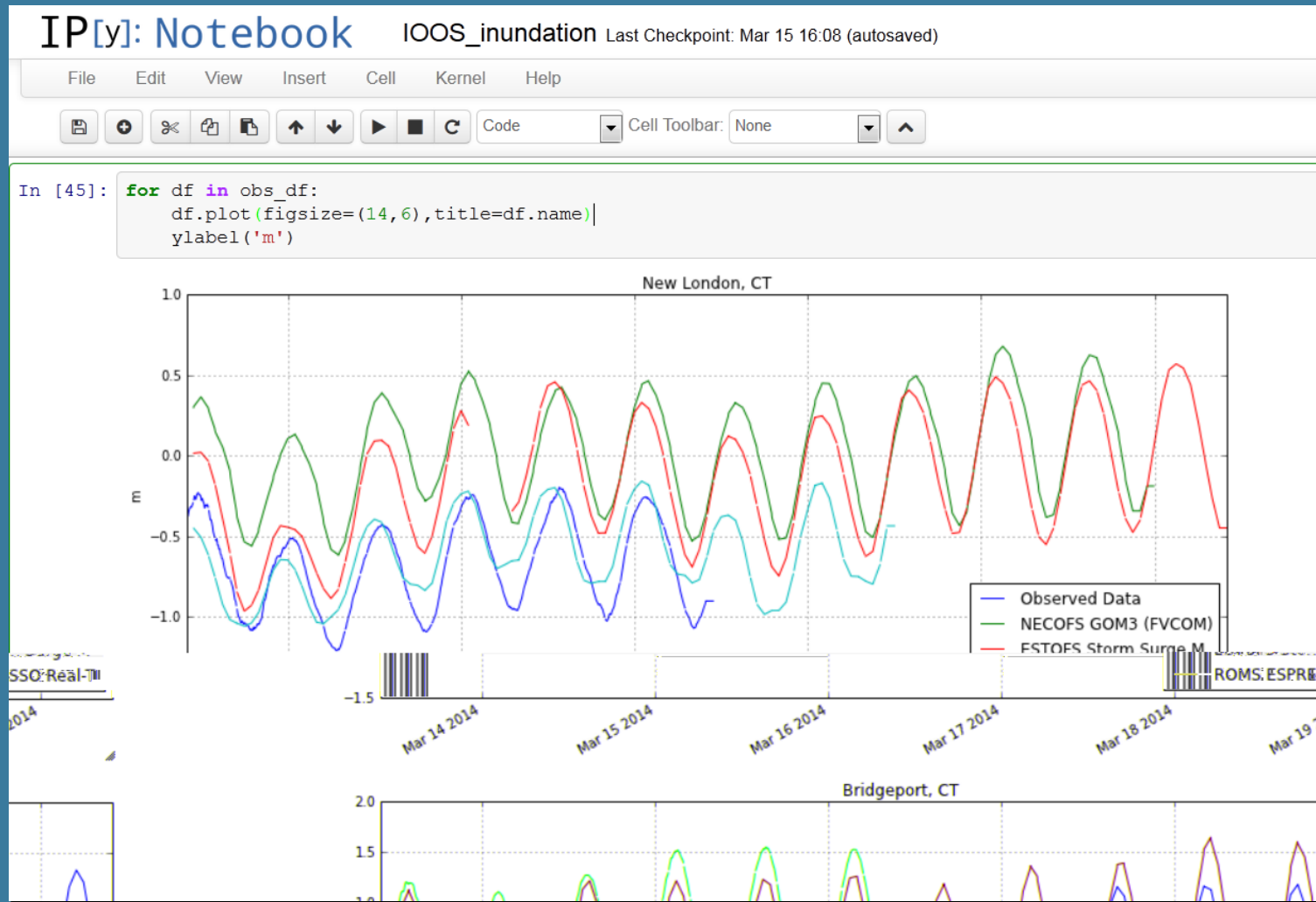
Specify a time range a

```
In [2]: # specific specific ti
# hurricane sandy
jd_start = dt.datetime(
jd_stop = dt.datetime(
# 2014 feb 10-15 storm
jd_start = dt.datetime(
jd_stop = dt.datetime(
```

Project Lead: Derrick Snowden
Notebooks: Kyle Wilcox, Andy Bird, Bob
Fratantonio, Kelly Knee, Will Koeppen,
Hannah Dean
<https://github.com/ioos/system-test>



Automated model comparison



SECOORA Model Assessment

```
with open(fname, 'w') as f:
    f.writelines(table)

to_html(bias.T)
```

Project Lead: Vembu Subramanian
Notebook: Filipe Fernandes
URL: <https://github.com/ioos/secoora>

Out [21]:

	COAWST_4	ESPRESSO	ESTOFS	HYCOM	SABGOM
Duck, NC	--	--	0.05	--	0.43
Oregon Inlet Marina, NC	-0.07	0.21	0.00	0.45	--
Wrightsville Beach, NC	-0.03	--	0.07	0.32	0.45
Springmaid Pier, SC	-0.04	--	0.08	--	0.45
Oyster Landing (N Inlet Estuary), SC	--	--	0.18	--	--
Fort Pulaski, GA	--	--	0.13	--	--
Fernandina Beach, FL	--	--	0.04	--	--
Mayport (Bar Pilots Dock), FL	--	--	0.01	--	--
Trident Pier, FL	--	--	-0.13	--	--
Lake Worth Pier, FL	-0.30	--	-0.11	0.07	--
Virginia Key, FL	--	--	-0.06	--	0.25
Vaca Key, FL	--	--	-0.06	--	--
Key West, FL	-0.28	--	-0.08	--	0.14
Naples, FL	--	--	-0.03	--	--
Port Manatee, FL	--	--	0.02	--	--
Clearwater Beach, FL	--	--	0.07	--	--
Cedar Key, FL	-0.10	--	0.09	--	0.18
Apalachicola, FL	-0.04	--	0.15	--	--
Panama City, FL	-0.02	--	--	--	--
Pensacola, FL	0.04	--	--	--	--

[Back to top](#)



Python & Matlab notebook

```
In [5]: %%matlab -i url -o s -o g
addpath(genpath('/home/filipe/IOOS/nctoolbox'));
nc = ncgeodataset(url);

s = nc{'salt'}(1, :, 11, 21);
g = nc{'salt'}(1, :, 11, 21).grid;
```

log4j:WARN No appenders could be found for logger (ucar.nc2.NetcdfFile).
log4j:WARN Please initialize the log4j system properly.

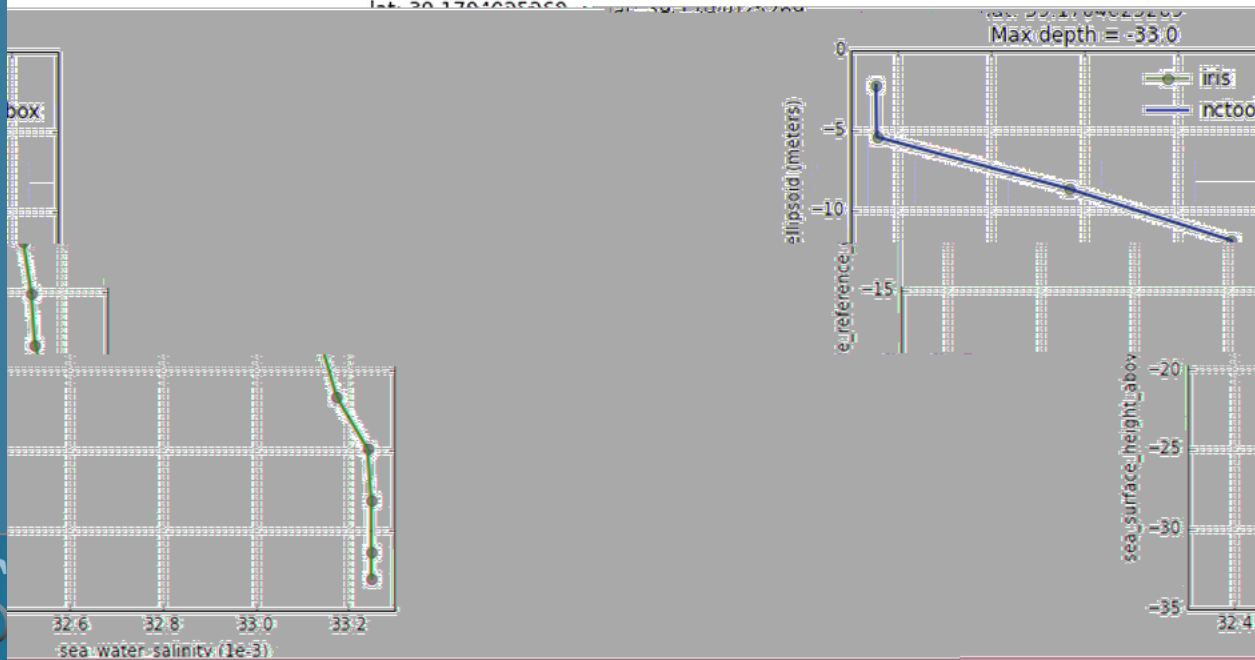
```
In [6]: kw = dict(linewidth=2, color=(0.6, 0.1, 0.15),
                alpha=0.75, label='nctoolbox')
leg = dict(numpoints=1, loc='best', framealpha=0)

c = cube[0, :, 10, 20]
fig, ax = plot_profile(c)

ax.plot(s, g['z'], **kw)
l = ax.legend(**leg)
```

lon: -74.0022201538

lat: 39.1704025268



Unidata Challenges

- **Community THREDDS Data Servers robustness**
- **Support as popularity increases**
- **UGRID incorporated into Unidata NetCDF-Java**
- **Aggregation of large collections of NetCDF files**
- **Met/Ocean tools developed for Python on top of CF/Ugrid conventions (Iris, libCF)**
- **IDV-like client built on top of Python tools**
- **Participation in standards (e.g. OGC)**
- **Managing community development**

Community Development

GitHub, Inc. [US] <https://github.com/Unidata/thredds/issues/75>

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Unidata / thredds Watch 22 Star 70 Fork 69

Update NcISO to specify gmd:protocol for service endpoints #75

Open rsignell-usgs opened this issue 10 days ago · 3 comments

rsignell-usgs commented 10 days ago

As discussed in the pycsw issue here: [geopython/pycsw#269](#), catalog services that rely on OWSlib like pycsw expect to have `gmd:protocol` specified in order to populate the scheme in the references that get returned from a CSW request. Without this, SOS, WMS, OpeNDAP endpoints, etc always come back with scheme of None.

Should just need to modify the `UnidataDD2MI.xml` file:
<https://github.com/Unidata/thredds/blob/f902e5a3573583a9b87f1d3c7d2f27a121289fe/tds/src/main/webapp/WEB-INF/classes/resources/xml/nciso/UnidataDD2MI.xml>

@pacioos, I know you've addressed this -- can you please submit a PR to fix this? I raised the same issue at [ethanrd/threddsIso#2](#) because I wasn't sure what the development path is on ncISO, and maybe we need to fix in both places?

rsignell-usgs commented 10 days ago

@tomkralidis, for populating `gmd:protocol` we should use the `identifier` listed in <https://github.com/OSGeo/Cat-Interop/blob/master/LinkPropertyLookupTable2.csv>, correct?

tomkralidis commented 10 days ago

👍

pacioos commented 9 days ago

OK, I've submitted the PR here: <https://github.com/Unidata/threddsIso/pull/1>
Cheers,
John

Labels
None yet

Milestone
No milestone

Assignee
No one assigned

Notifications

You're receiving notifications because you authored the thread.

3 participants



Community Development

GitHub, Inc. [US] <https://github.com/Unidata/threddsIso/pull/1>

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Unidata / threddsIso forked from ethanrd/threddsIso Watch 17 Star 0 Fork 3

Add gmd:protocol, location keywords, & viewer URLs #1

Merged geoneubie merged 1 commit into Unidata:master from pacioos:patch-1 8 days ago

Conversation 2 Commits 1 Files changed 1 +110 -0

pacioos commented 10 days ago

This update does three things:

- 1) Adds gmd:protocol elements to all service end points (sv:SV_ServiceIdentification) identifying them as either OPeNDAP:OPeNDAP, UNIDATA:NCSS, OGC:WMS, OGC:WCS, or OGC:SOS--the appropriate valids from this list: <https://github.com/OSGeo/Cat-Interop/blob/master/LinkPropertyLookupTable2.csv>.
- 2) Add GCMD Location Keywords from THREDDS catalog metadata: all "geospatialCoverage > name" entries.
- 3) Adds each "viewer" entry from the THREDDS catalog metadata as an additional gmd:distributorTransferOptions.

John Maurer jmaurer@hawaii.edu

tomkralidis commented 9 days ago

@pacioos huge 👍 !

geoneubie closed this 8 days ago

geoneubie merged commit 52f1bf8 into Unidata:master from pacioos:patch-1 8 days ago

Labels
None yet

Milestone
No milestone

Assignee
No one assigned

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4 participants



Why do I promote Unidata technologies?

- **Powerful**
- **Flexible**
- **Easy to install**
- **Free**
- **Supported**
- **Driven by community of users**









angel
baby
PHOTOFANIA
Bebele C. B. 1999

SHINE ON!



Summary (1 of 2)

- Common data models for “feature types” (structured and unstructured grids, time series, profiles, swaths) (Unidata CDM)
- **Standard web services for delivering these data and metadata (OGC, Unidata)**
- Tools to access and process these services in common analysis environments: R, Matlab, Python, ArcGIS, JavaScript

Summary (2 of 2)


- **It's easy (1 hour) to deploy free, supported systems that allow for standards-based delivery of aggregated data from native model grids that put little effort on the data provider**
- **What do you get?**
 - Lots of choices for data access (Browser, Matlab, Python, Excel, IDV, R, IDL)
 - More usage of model results by more people
 - Faster feedback to modelers, leading to improved models
 - Shared code base in the community
 - Increased community support for standards-based access
 - Less time wasted messing with data, more time spent on ecosystem based management
- **What should you do? Encourage providers to use these standards, and develop tools that use standardized access**

More at: [Github.com/rsignell-usgs](https://github.com/rsignell-usgs)

← → ↻ 🏠 **GitHub, Inc. [US]** <https://github.com/rsignell-usgs> 🔍 ☆ M NB ☰

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Rich Signell
rsignell-usgs

🌐 USGS
📍 Woods Hole, MA
✉️ rsignell@usgs.gov
🕒 Joined on Jun 20, 2012

29 Followers **2** Starred **8** Following

Organizations



Contributions 🔒

Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug

M
W
F

Summary of Pull Requests, issues opened, and commits. [Learn more.](#) Less 🟡 🟢 🟣 More

Year of contributions 725 total Aug 27 2013 - Aug 27 2014	Longest streak 10 days March 10 - March 19	Current streak 3 days August 25 - August 27
--	---	--