Unidata/ESRI Advances: Geoportal Server+THREDDS ArcGIS10+OPeNDAP

Rich Signell (USGS), Woods Hole, MA

With thanks to
Christine White (ESRI), Christoph Gohlke (UCI),
Curtis Price (USGS), Kevin O'Brien (NOAA)

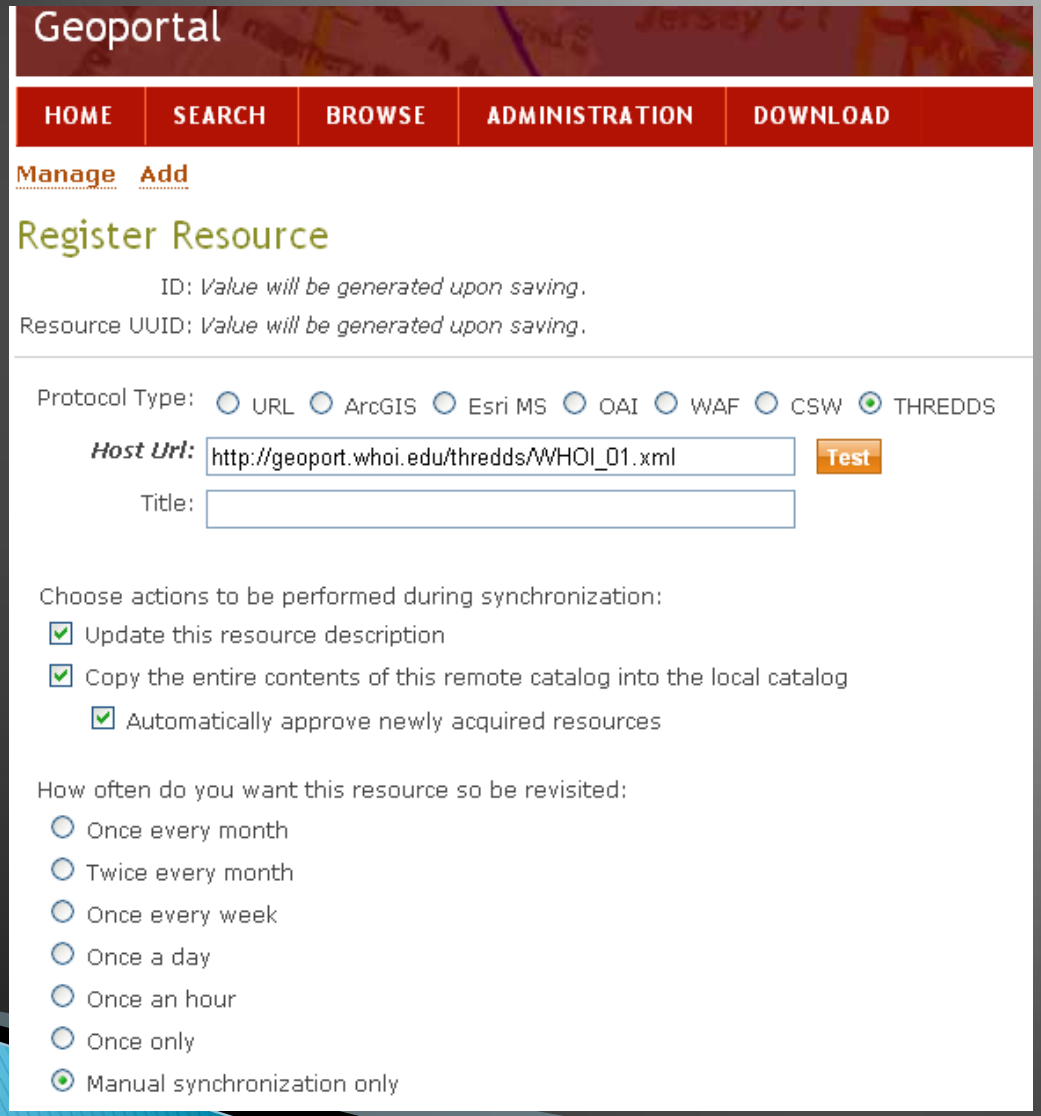
Why should we care about ESRI?

- Geoportal Server has been selected as a key tool by NOAA NODC, UAF, Geodata.gov=>data.gov to find data
- At the 2011 USGS Community for Data Integration Workshop, ArcGIS was polled as #1 tool used for scientific analysis (ArcGIS:65%, OpenSource GIS:12%, Python:8%, Matlab:5%, R:5%, Other:5%)
- Not just popular at USGS: 13,000 attendees last year at the Annual ESRI Users Conference!
- ESRI products commonly used by environmental planners and managers
- And we want to help Dan Sampson, Massachusetts Coastal Zone Manager

1. Geoportal Server & THREDDS

- Geoportal Server harvests metadata from OGC and other data services, and provides catalog services
- Formerly $$$ proprietary ESRI product, now free open source product!
- With a small ($2400) injection of end-of-FY11 funds to ESRI to get the ball rolling…
- …Geoportal Server now crawls THREDDS catalogs, reading ncISO service metadata!

Register the THREDDS resource



Confirm Synchronization

Synchronization Report

Resource Name: http://geoport.whoi.edu/thredds/WHOI_01.xml

Resource UUID: {60F7CF8B-E05C-4706-A651-7B673806594F}

Resource URL: http://geoport.whoi.edu/thredds/WHOI_01.xml

Protocol: None

Report UUID: {7707A8BC-7DEC-449B-B63D-08441AA37F63}

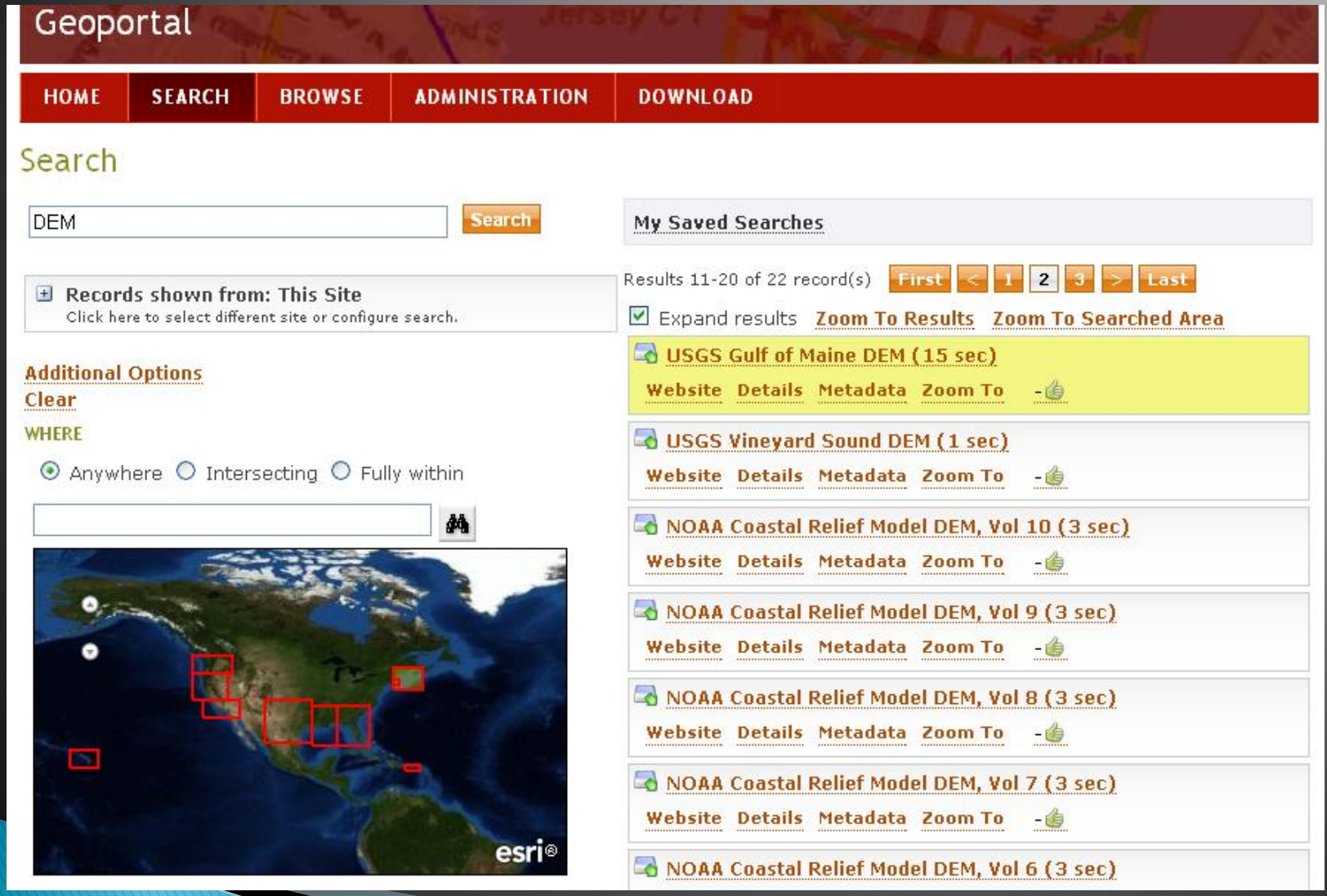
Summary

Parameter	Value
saveOutput	OFF
validate	OFF
publish	ON
harvestEnd	Fri Oct 21 13:21:01 PDT 2011
docsHarvested	530
docsPublished	530
docsAdded	530
docsUpdated	0
docsFailed	0
duration	4 minutes, 26 seconds, 68 milliseconds
average	119.5rec/min
Number of listed records limited to 70	

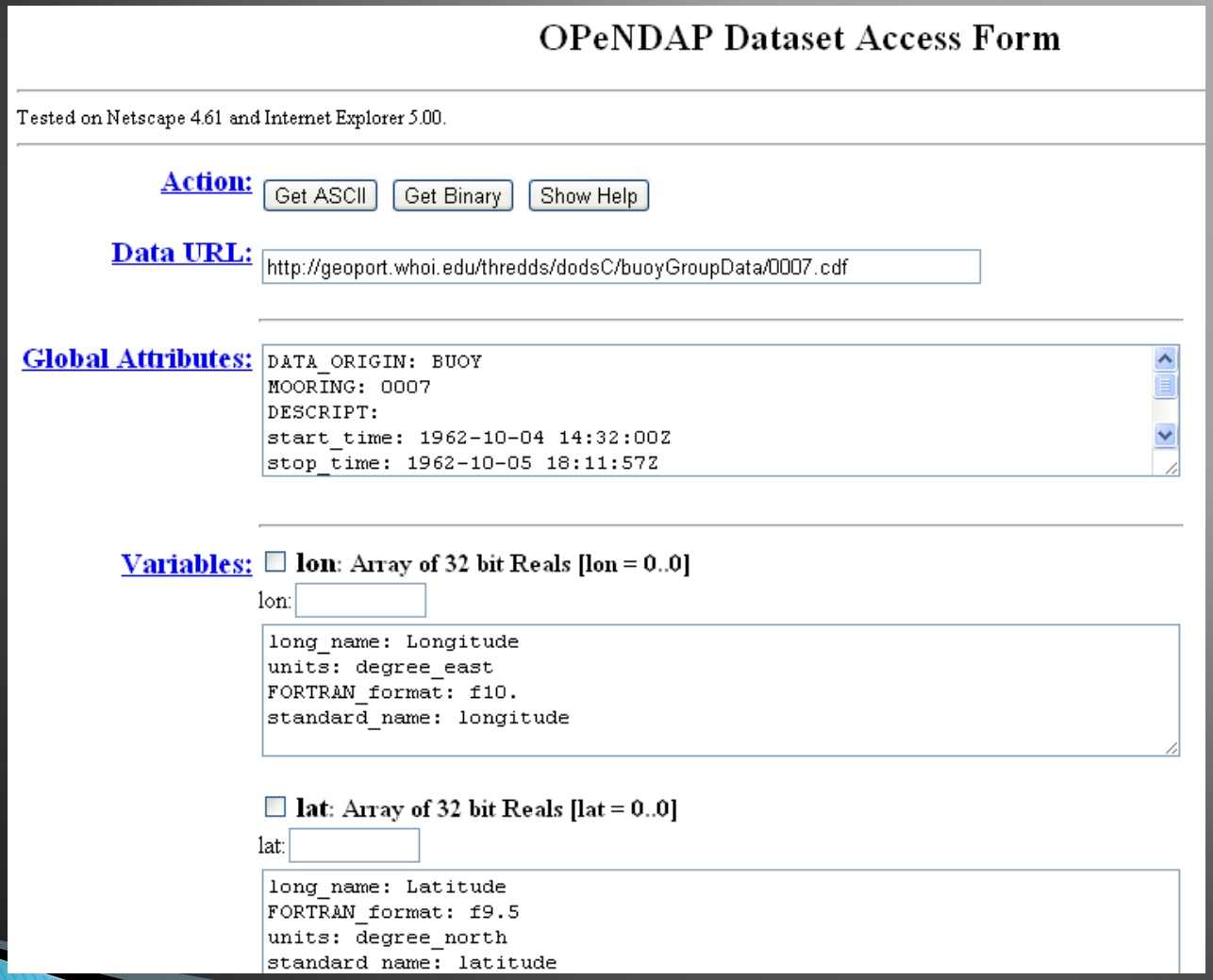
Details

Source URI	Validation Status	Publish Status
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0007.cdf	OK	OK
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0008.cdf	OK	OK
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0014.cdf	OK	OK
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0015.cdf	OK	OK
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0070.cdf	OK	OK
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0072.cdf	OK	OK
http://geoport.whoi.edu/thredds/iso/buoyGroupData/0111Y.cdf	OK	OK

View Results



Drilling Down on the "Website" link



OPeNDAP Dataset Access Form

Tested on Netscape 4.61 and Internet Explorer 5.00.

Action: Get ASCII | Get Binary | Show Help

Data URL: http://geoport.whoi.edu/thredds/dodsC/buoyGroupData/0007.cdf

Global Attributes:

```
DATA_ORIGIN: BUOY
MOORING: 0007
DESCRIPT:
start_time: 1962-10-04 14:32:00Z
stop_time: 1962-10-05 18:11:57Z
```

Variables:

☐ **lon**: Array of 32 bit Reals [lon = 0..0]

lon:

```
long_name: Longitude
units: degree_east
FORTRAN_format: f10.
standard_name: longitude
```

☐ **lat**: Array of 32 bit Reals [lat = 0..0]

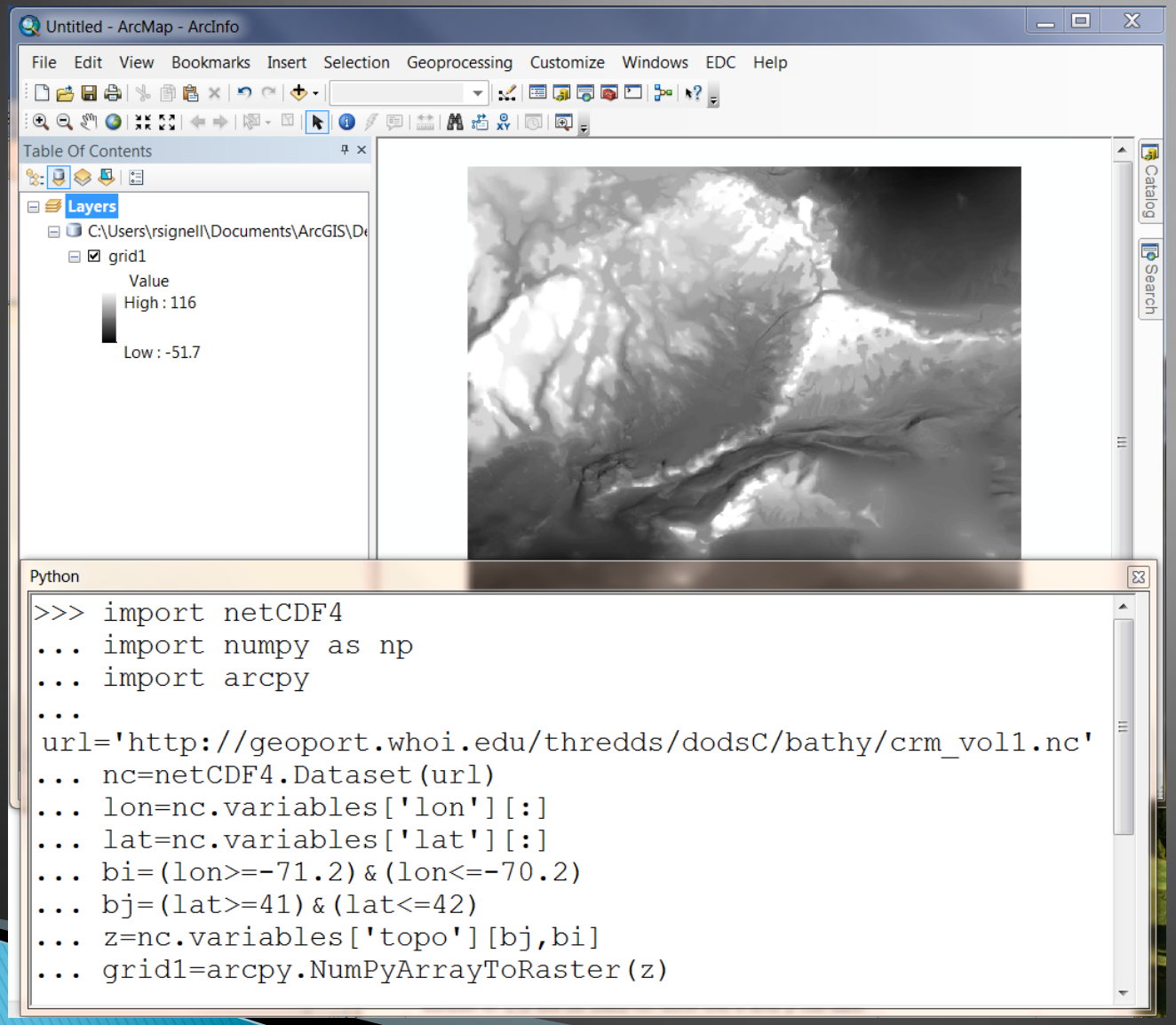
lat:

```
long_name: Latitude
FORTRAN_format: f9.5
units: degree_north
standard_name: latitude
```

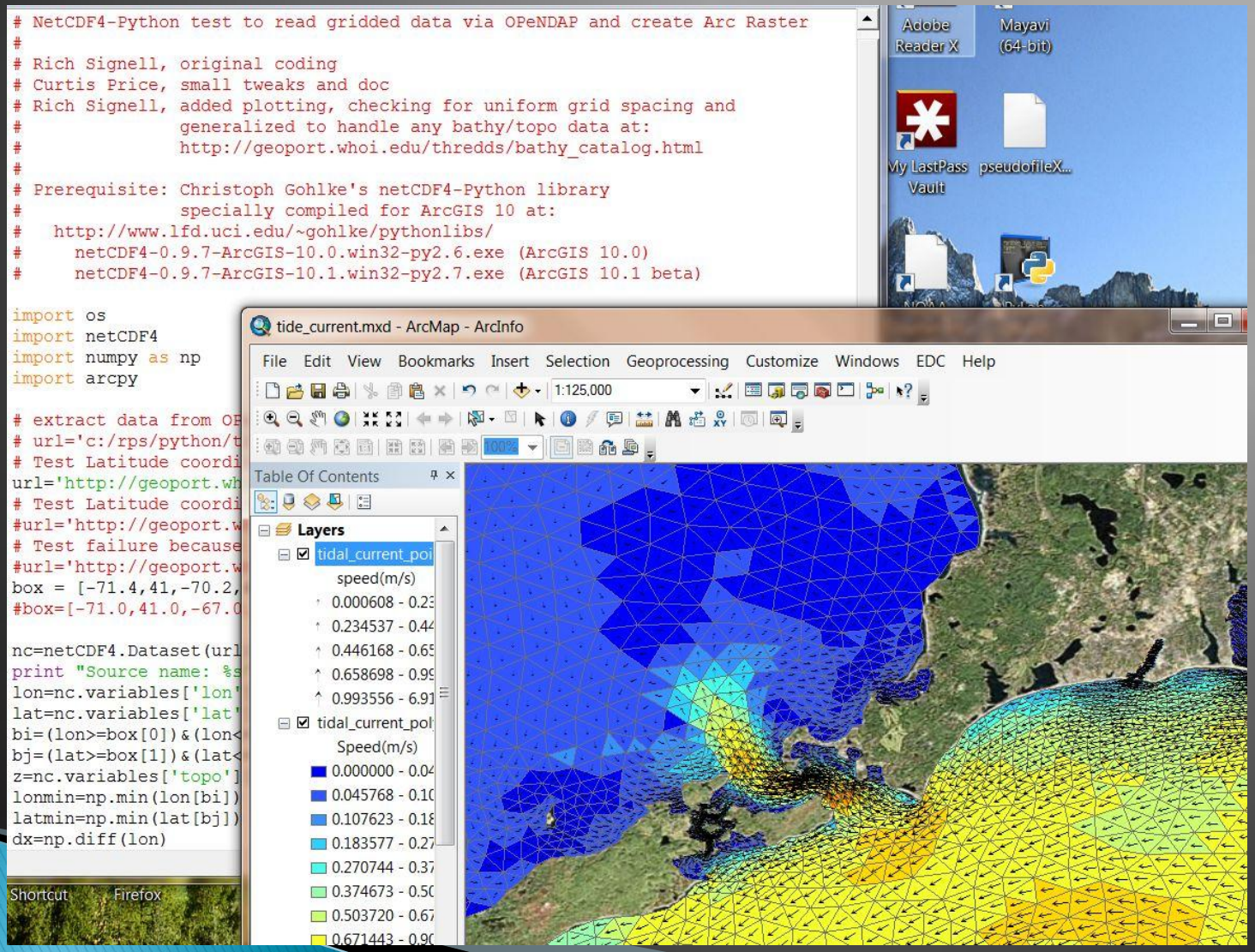
2. OPeNDAP => ArcGIS10.0

- ArcGIS10.0 has strong Python integration
- There are several Python OPeNDAP modules
- PyDAP? NO!
- NetCDF4-Python? YES! Common interface for NetCDF files and OPeNDAP datasets!
- But a problem… NetCDF4-Python had not been built for Windows
- Python community's Christoph Gohlke (UCI) to the rescue!!! (Python 2.6/2.7/3.0 Win32/Win64 and special ArcGIS10.0 and ArcGIS10.1 builds)

OPeNDAP GRID => ArcGIS Raster



OPeNDAP UGRID => ArcGIS Shapefile




```
# NetCDF4-Python test to read gridded data via OPeNDAP and create Arc Raster
#
# Rich Signell, original coding
# Curtis Price, small tweaks and doc
# Rich Signell, added plotting, checking for uniform grid spacing and
#               generalized to handle any bathy/topo data at:
#               http://geoport.whoi.edu/thredds/bathy_catalog.html
#
# Prerequisite: Christoph Gohlke's netCDF4-Python library
#               specially compiled for ArcGIS 10 at:
#   http://www.lfd.uci.edu/~gohlke/pythonlibs/
#     netCDF4-0.9.7-ArcGIS-10.0.win32-py2.6.exe (ArcGIS 10.0)
#     netCDF4-0.9.7-ArcGIS-10.1.win32-py2.7.exe (ArcGIS 10.1 beta)

import os
import netCDF4
import numpy as np
import arcpy

# extract data from OP
# url='c:/rps/python/t
# Test Latitude coordi
url='http://geoport.wh
# Test Latitude coordi
#url='http://geoport.w
# Test failure because
#url='http://geoport.w
box = [-71.4,41,-70.2,
#box=[-71.0,41.0,-67.0

nc=netCDF4.Dataset(url
print "Source name: %s
lon=nc.variables['lon'
lat=nc.variables['lat'
bi=(lon>=box[0])&(lon<
bj=(lat>=box[1])&(lat<
z=nc.variables['topo']
lonmin=np.min(lon[bi])
latmin=np.min(lat[bj])
dx=np.diff(lon)
```

Leveraging of Unidata technology in other applications is the future, made easier by:

- NetCDF Java library development => Matlab
- NetCDF C library development => Python, R
- Convergence on a few OS: Redhat/CentOS, Ubuntu, Mac, Windows
- Web services (e.g. OPeNDAP, ncISO)

What does the advances mean?

- It means that we can find THREDDS (and other) data easier, and can integrate THREDDS data into Geodata.gov => Data.gov
- It means ArcGIS folks can “help themselves” to the world of OPeNDAP data
- Dan Sampson, coastal zone manager in Massachusetts, working in ArcGIS, can locate relevant THREDDS data, and create his own products from OPeNDAP Data