ioapiTools:
A python analysis environment for CMAQ, SMOKE, and MCIP

Alexis Zubrow
CISES, University of Chicago

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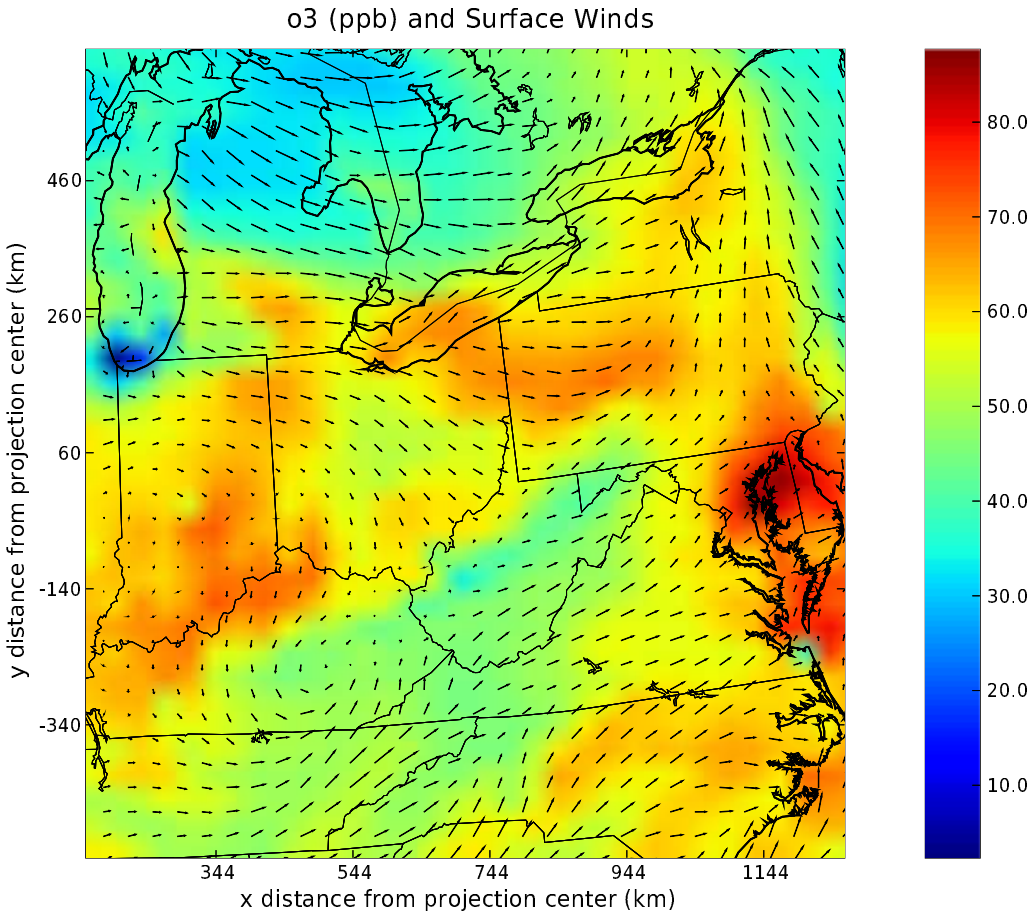
the Need

- IOAPI format
- compiled code
- analysis seperated from plotting



Functionality

- Reading/Writing IOAPI files
- Export to CF netCDF
- Subsetting & Coordinate Transforms
- Access to Metadata
- Plotting
- Interpreted Language

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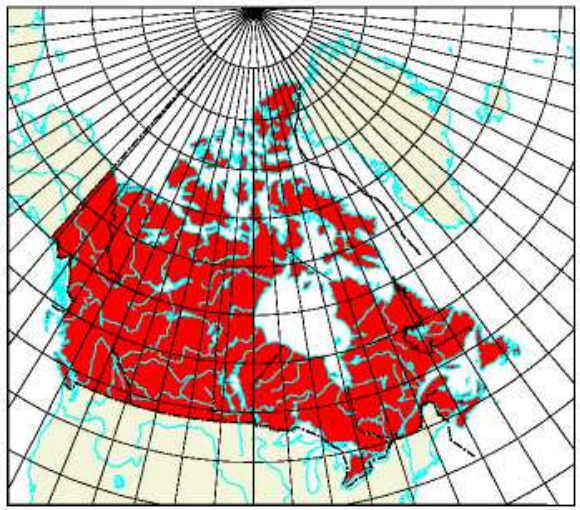

reference: atlas.gc.ca

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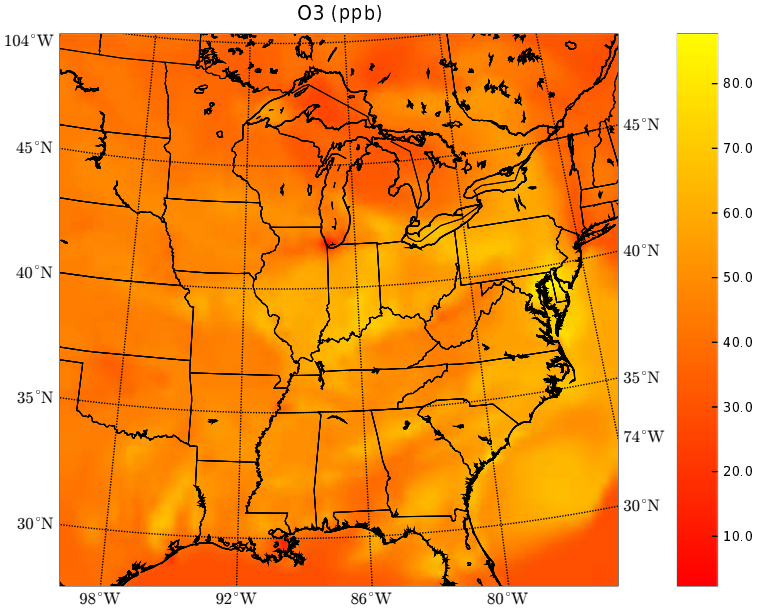

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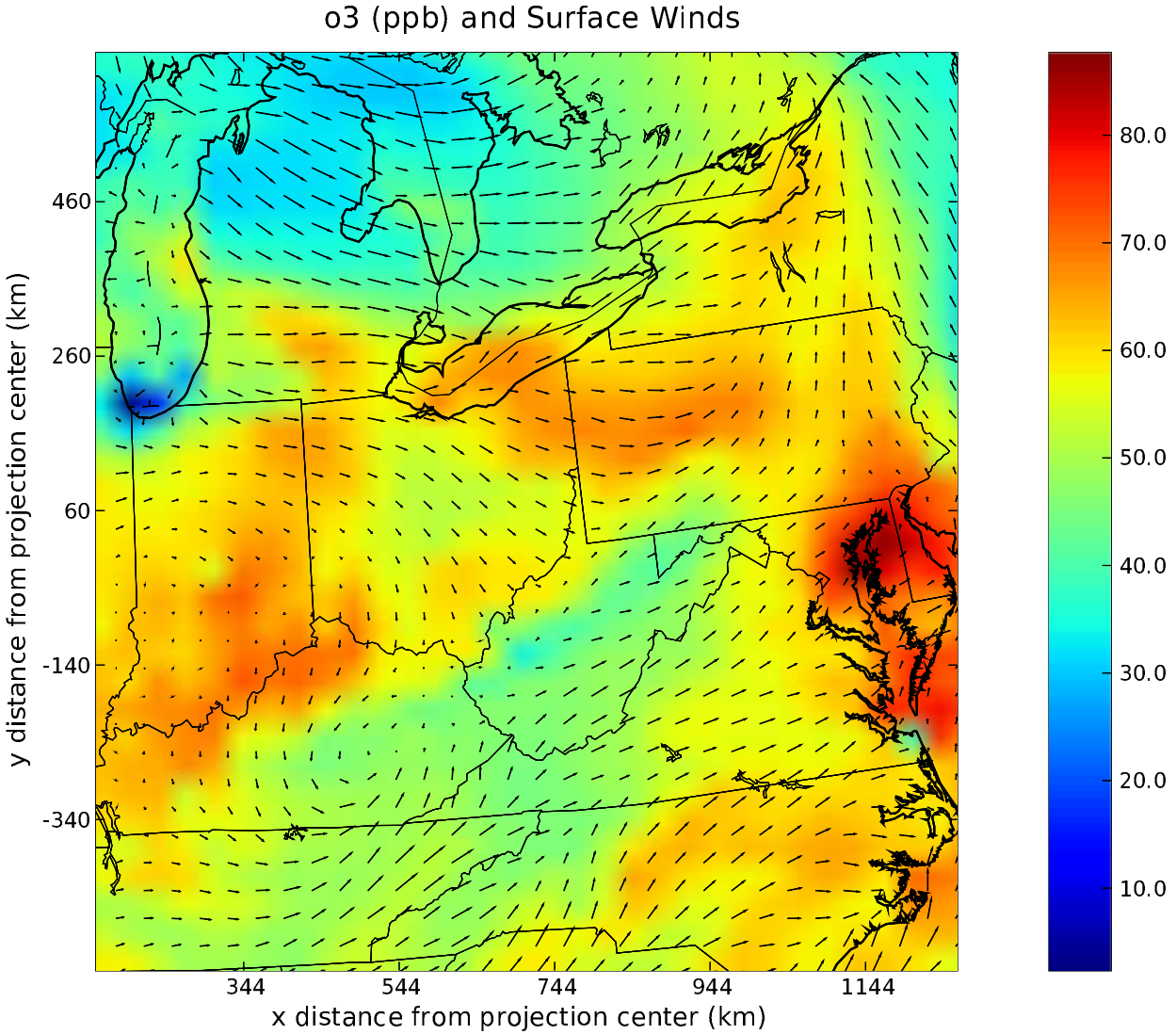
why python?

- Interpreted Language
- Clarity
- Glue
- Extendible


o3 (ppb) and Surface Winds
460
260
60
-140
-340
y distance from projection center (km)
344
544
744
944
1144
x distance from projection center (km)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0

Example Script

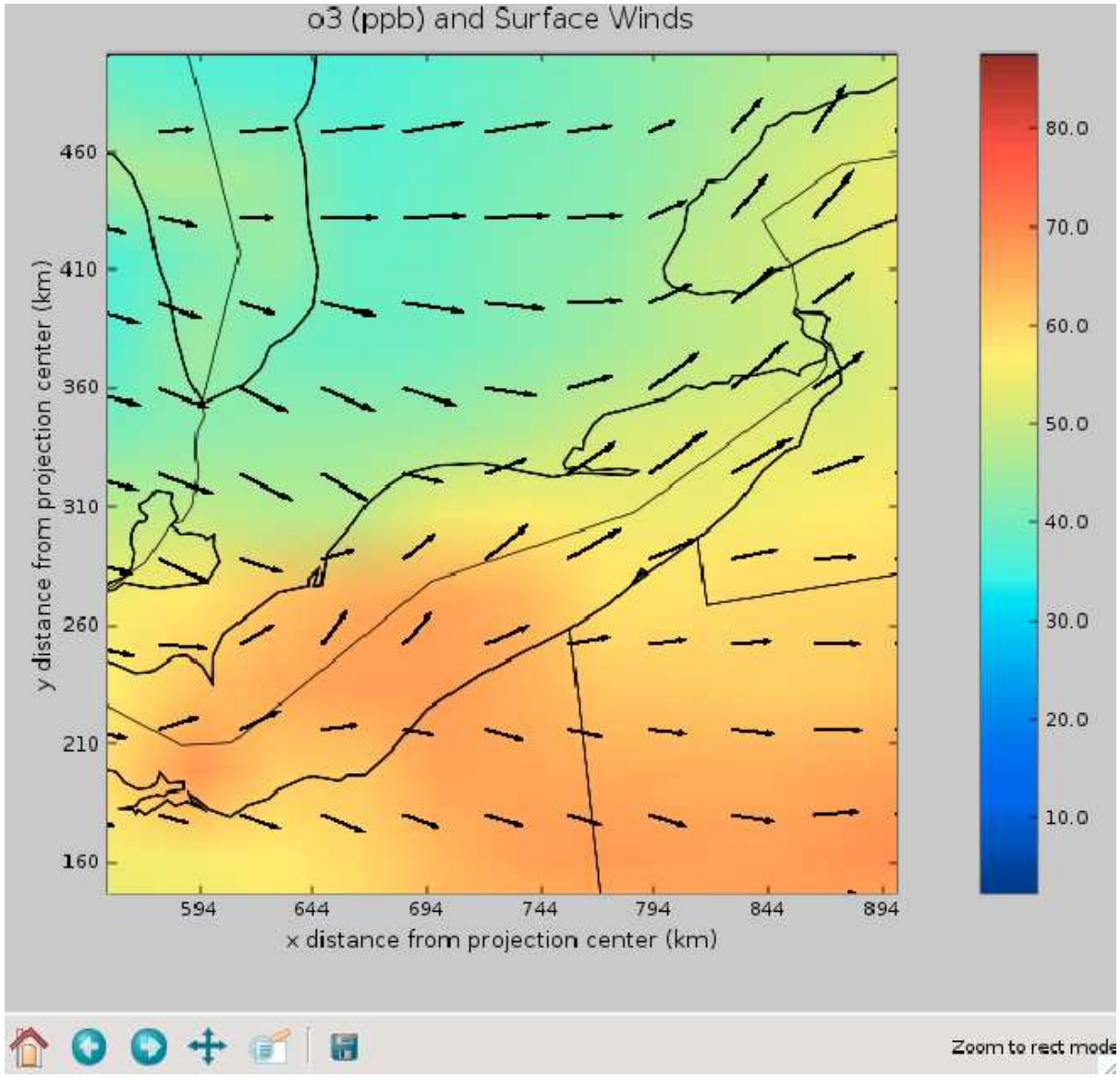
```
## load module
from ioapiTools import *

## open 2 IOAPI files
f = open("CCTM_ACONC.D1.038")
g = open("METDOT3D_D1.038")

## Get o3 from first file
o3 = f("o3")

## Get 2 components of the winds from the MCIP file
u =g("uwind")
v =g("vwind")
```

Script (cont)

```
## Convert o3 from ppm --> ppb
o3 = o3 * 1000.
o3.units = "ppb"

## Subset the variables
o3_sub = o3.IOsubset(domainLst=[(-88, 35), (-73, 45)])

u_sub = u.IOsubset(domainLst=[(-88, 35), (-73, 45)], \
                   layerLst=0)
v_sub = v.IOsubset(domainLst=[(-88, 35), (-73, 45)], \
                   layerLst=0)
```

Script (cont)

```
## Contour plot of o3
cDct = o3_sub(12).contour(title="o3 (ppb) and Surface Winds")

## Plot the wind vectors on top of the contour
ovector(u_sub(12), v_sub(12), cDct)

## Save subsetted o3 to new IOAPI file
k = open("o3_slice.ioapi","w",iofileFlag)
k.write(o3_sub)
k.close()
```


o3 (ppb) and Surface Winds
460
410
360
310
260
210
160
y distance from projection center (km)
594
644
694
744
794
844
894
x distance from projection center (km)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
Zoom to rect mode

Websites

python: www.python.org

CDAT: www-pcmdi.llnl.gov/software-portal/cdat/

email contact: azubrow@uchicago.edu