Advances in Python for Community Multiscale Air Quality Analyses: A planet in the Cloud?

Barron H. Henderson

2021-11-04

The views expressed in this presentation are those of the authors and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency

The CMAS community needs Jupyter Lab

- Jupyter Lab is a notebook with web-based file browser and terminals
  - Docs, code, results, and images
  - Reusable with a minimum effort
  - R, Python, Bash, even C
- Easy install windows, linux, mac
  - Use a python installer
  - run `pip install --user jupyterlab`
  - `jupyter lab` or `jupyter.exe lab` to get a web-based platform
- Jupyter Notebooks are a great way to share analysis systems.

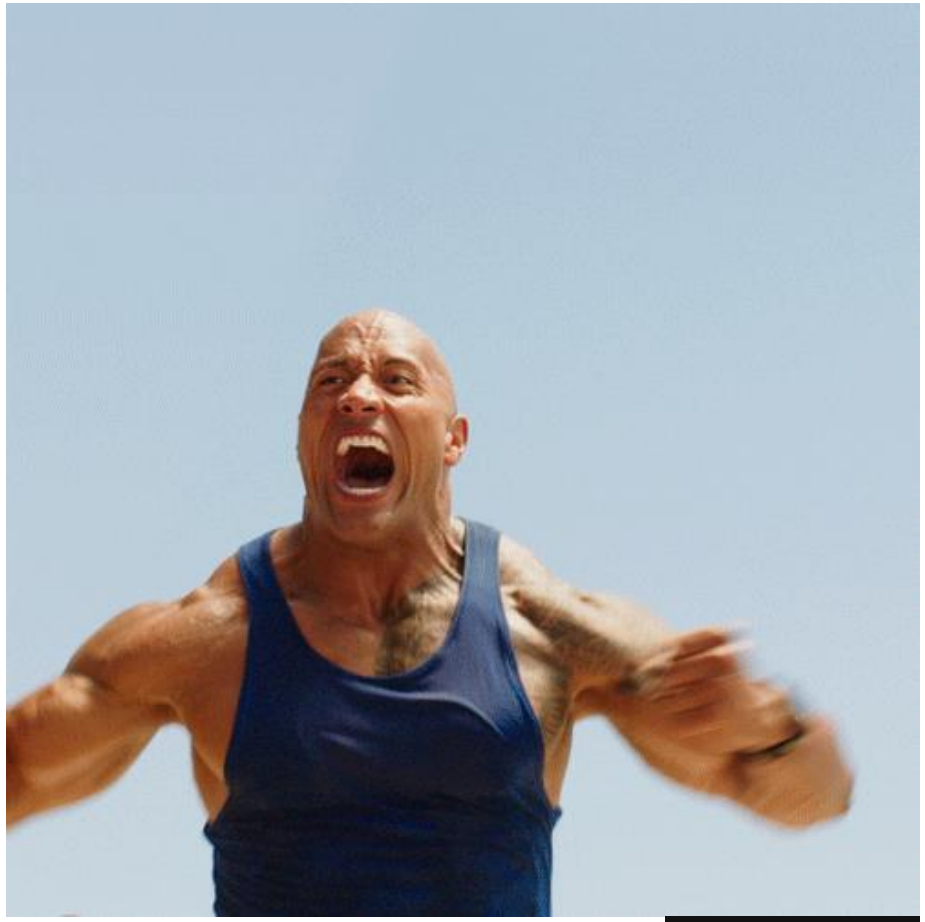
Jupyter give anyone access to cloud computing services.

- Available all kinds of places
  - Google Colab (integrated GitHub)
  - Amazon SageMaker
  - Azure (recently dropped easy access)
  - Add it to any system (see last slide)
- The interface is the same in the cloud as on your machine…

Jupyter in the cloud means instant access to huge data resources!

- https://registry.opendata.aws/
  - NOAA already has GOES
  - NASA already has OMI L3 data
  - GEOS-Chem emissions and meteorology
- https://cloud.google.com/solutions/datasets
  - NOAA: Rapid Refresh (RAP) Forecasts, monthly climate data (nclimgrid), GFS, HRRR, etc
  - USGS Landsat
  - EPA observations
- Much more to come!

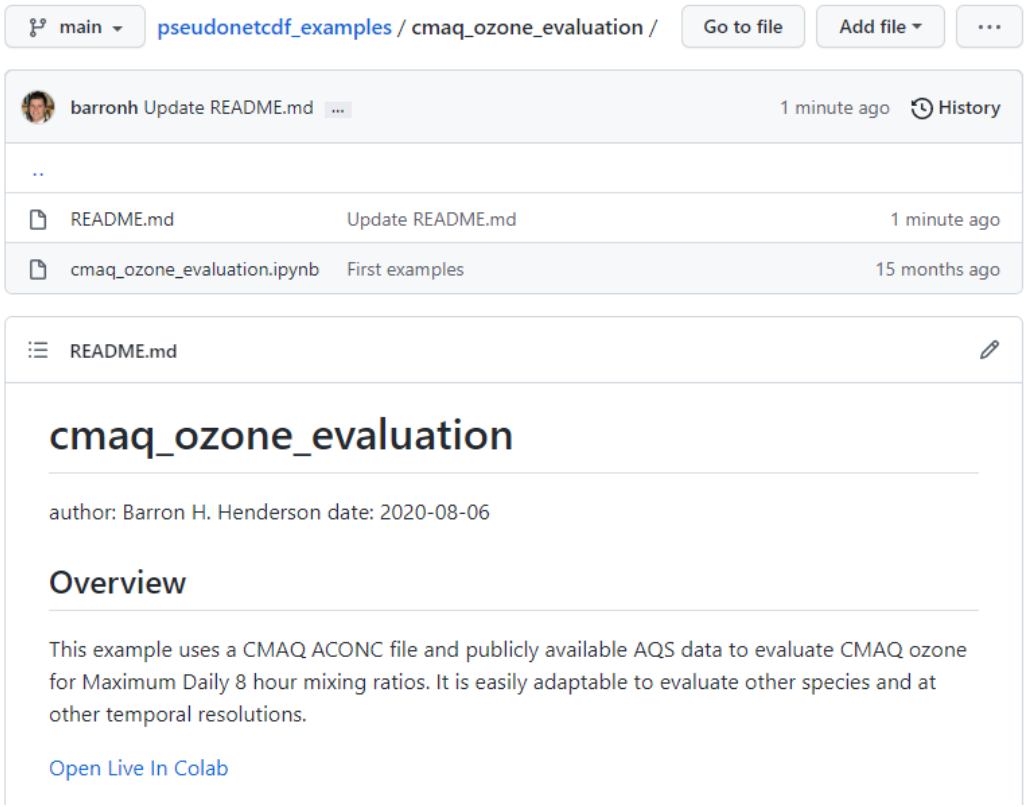
Bring the creativity and POWER!



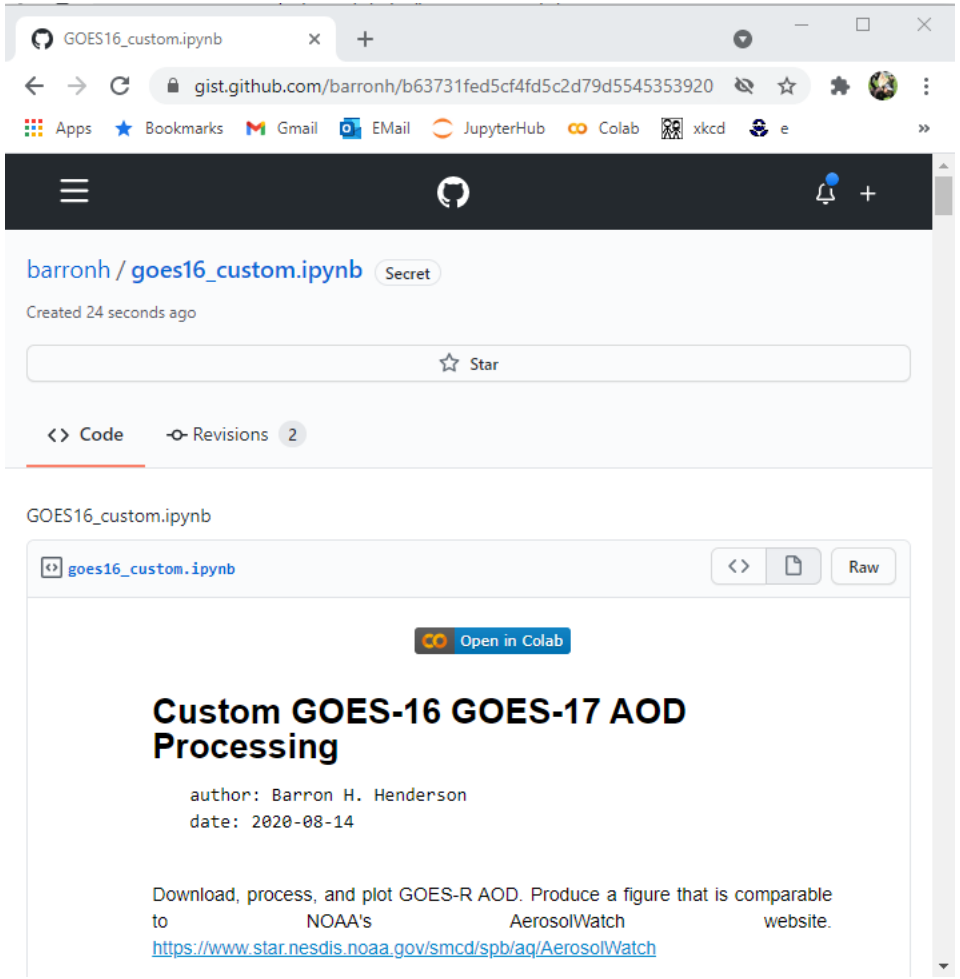
How can I get started?

If you want to get started with geostationary satellite data and python but aren't sure how, try plotting GOES-16 AOD or TEMPO Synthetic NO2 data.

These are primers, and not targeted toward specific applications.



https://github.com/barronh/pseudonetcdf_examples



https://gist.github.com/barronh/b63731fed5cf4fd5c2d79d5545353920

What could it look like?

- A repository of fully functional runnable code.
- Oriented toward solving our types of problems.
- Right now, the CMAS Forum Python Channel allows us to link to these sorts of things
  - cmascenter.org -> Help -> CMAS Forum -> Category Python
  - https://forum.cmascenter.org/c/python/