"A Carpenter Is Only as Good as His or Her Tools": Doing Good Science and How I Became a Python Evangelist

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Lives of Significance and Service

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Outline

- ☐ Doing good science and the importance of tools.

- ☐ How I found out good software tools matter and what Python can do.

- ☐ What I do as a Python evangelist.

- ☐ What prepared me for what I do now.

What do you think of when you think about "doing science?"

- ☐ Discovering universal laws?
- ☐ The joy of learning about the world?
- ☐ Creating new tools for the benefit of humanity?
- ☐ A lot of hard work?

The "results" of science vs. the "tools" of science.

What tools do we need for good science?

- ☐ Personal: Mind, heart, skills, luck.
- ☐ Community: Support, mentoring, advice, teamwork, etc.
- ☐ Data collection tools: Rawinsondes, radar, satellites, etc.
- ☐ Experimental tools: Wind tunnels, rotating tables, chemical apparatus, etc.
- ☐ Computational hardware
- ☐ Software tools: Programming languages, applications, etc.

How I found out good software tools matter

□ Late 1980's: B.S. and M.S. (Stanford): Dabbled in a random assortment of software tools. No idea how to do much beyond Excel.

□ 1990's: Ph.D. and postdoc #1 (UCLA and CIRES/University of Colorado):

- Tried several tools (e.g., Fortran, GrADS, GMT, IDL).
- Worked okay, but each tool was limited to certain tasks.
- Tools can't talk to each other ⇒ writing files all the time ⇒ grrr!

□ Early 2000's: Postdoc #2 (University of Chicago):

- My research group was using Python, so I gave it a try.
- Found out with Python I could do more than just a few tasks but practically anything, all in one environment.

□ And Python is **free!**

An example of doing everything with Python
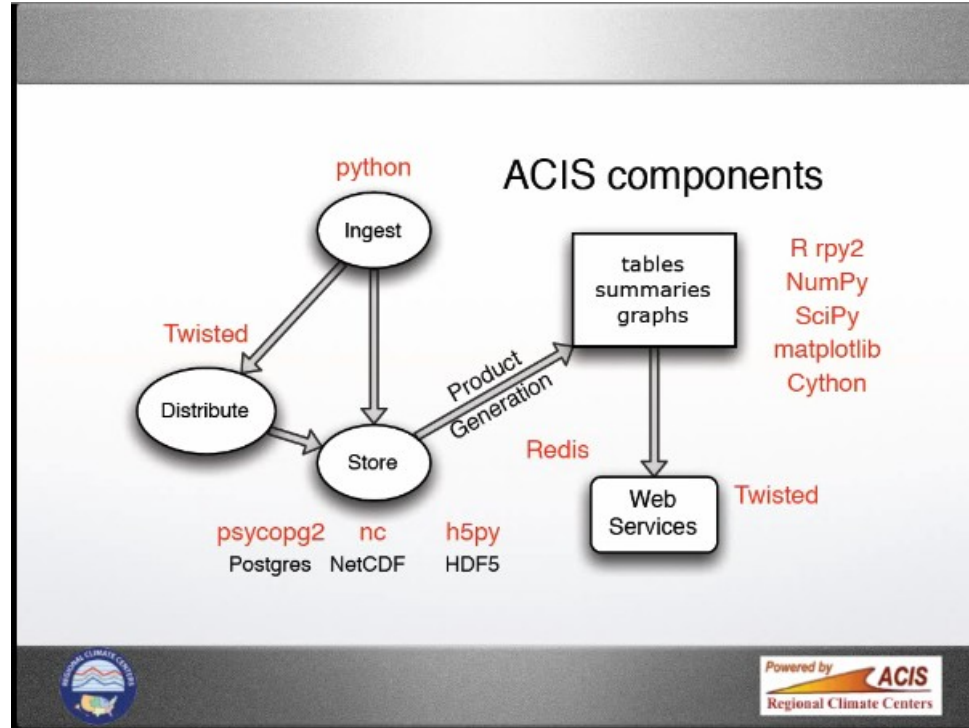
□ Problem: Many different components of the Applied Climate Information System: Data ingest, distribution, storage, analysis, web services.

□ Solution: Do it all in Python: A single environment of shared state vs. a crazy mix of shell scripts, compiled code, Matlab/IDL scripts, and web server makes for a more powerful, flexible, and maintainable system.

Image from: AMS talk by Bill Noon, Northwest Regional Climate Center, Ithaca, NY, http://ams.confex.com/ams/91Annual/flvgateway.cgi/id/17853?recordingid=17853

What I do as a Python evangelist

- My "day" job:
  - Teach physics at a small liberal arts college.
  - Do disciplinary research (atmospheric sciences, dynamical systems, philosophy).
- But in addition, I do a lot with trying to build up the community of Python users in the atmospheric sciences:
  - "Evangelist" is from the Greek, literally "bringer of good news."
  - Here the good news is how this tool can make your science better and your life easier!
  - Help new users learn the language (2011 and 2012 AMS Short Course).
  - Help run the PyAOS website and mailing list.

The PyAOS website and community

- A clearinghouse resource for:
  - New atmospheric and oceanic sciences (AOS) users interested in learning Python.
  - Experienced AOS users to learn of recent advances, support one another, give tips, etc.
- Features:
  - Mailing list
  - Featured Tips
  - Articles and announcements.
  - Packages listing
  - Training listings: Including the home page for some AMS Short Courses.

What prepared me for what I do now

- My previous work experience is very varied, but all of them have helped prepare me for what I do now.
- Practicing being self-observant of:
  - Suffering through years of limited software tools to think of ways things could be better.
  - All the mistakes I made in learning how to program, so I can teach in a way that (hopefully) communicates to the person just starting out.
- Building community: Years of working with junior high and high school students at my church taught me that God gave everyone gifts to share and that living in love and service is core to building a community.
- Leading: My experience is that a lot of it is just showing up and taking initiative to do something no one else is doing (e.g., how the AMS Python Symposium was started).
- Teaching, especially general education: At a liberal arts college, you teach a lot.

Interested in Python?
http://pyaos.johnny-lin.com