COLLEGE OF AGRICULTURE & LIFE SCIENCES
Natural Resources & the Environment

BIO5 Institute

Prepared for the Arizona Society for Range Management Meeting, August 4-5, 2022

Key Takeaways

- Open Science is a requirement for public funding 💰
- ☁️Cloud-computing is 👑
- Scientific Data 💾should be stored in:
  - ☁️ cloud-native formats
  - 💻Be analysis ready
  - 🔓Be publicly available

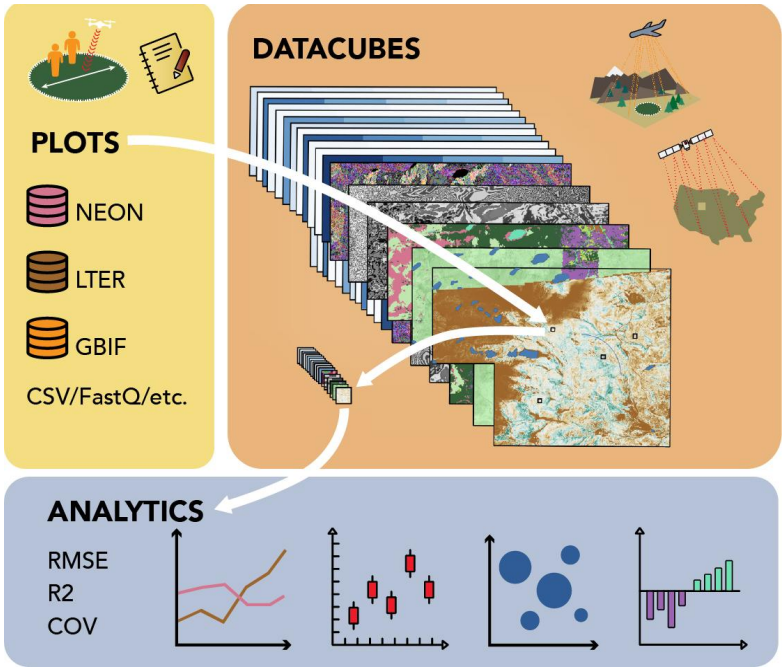


Fig 1: National observation networks collect plot-level detail (left) that can be augmented using a variety of remote sensing systems (right). When data are stored in modern cloud-native formats as analysis ready data cubes, analyses can be done on select spatio-temporal locations and data types.

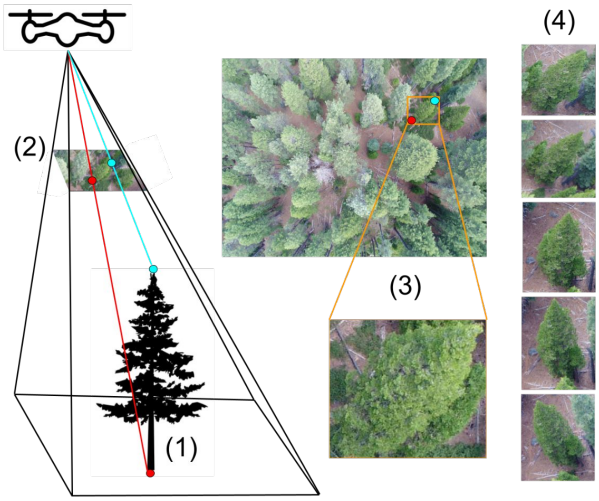
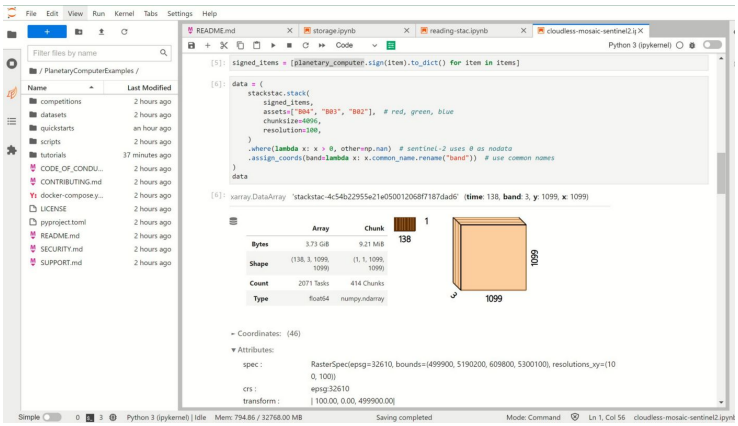


Fig 2: sUAS imagery of trees and forests (1-3) present unique problems related to parallax angles (4). However, these data present new opportunities for observation of fine details never before captured.

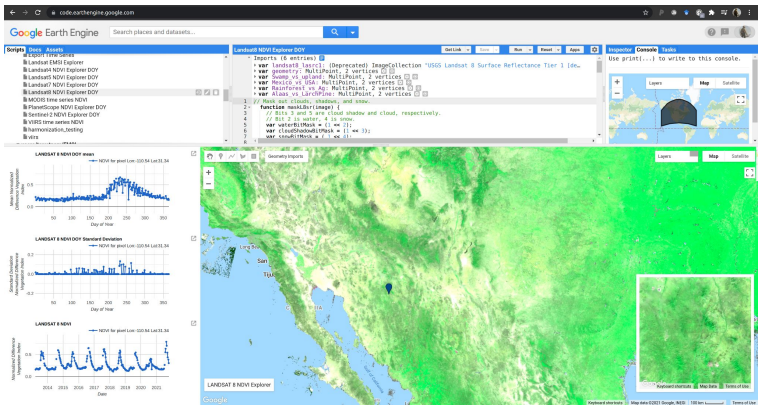
Image Credits: Da-Jiang Innovations

- Small uncrewed aerial systems (sUAS) are tightly regulated over security concerns
- Data are difficult to collect and require skilled pilots
- Data fill local-area (plot to stand scale) collection needs but are not appropriate for landscape scale observations

- Computational Notebooks are for literate computer programming (writing, code, analyses) in your web browser
- CyberGIS from Microsoft and Google now support the entire history of satellite and weather observations



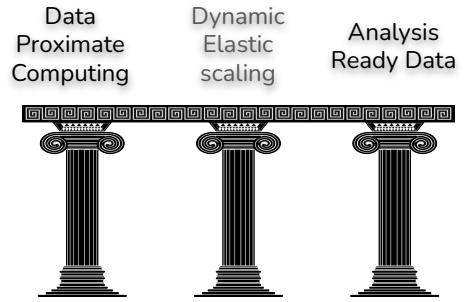
https://planetarycomputer.microsoft.com/



https://code.earthengine.google.com/

College of Agriculture & Life Sciences
Natural Resources & the Environment
BIO5 Institute

Contact me: tswetnam@arizona.edu
Website: https://tysonswetnam.com



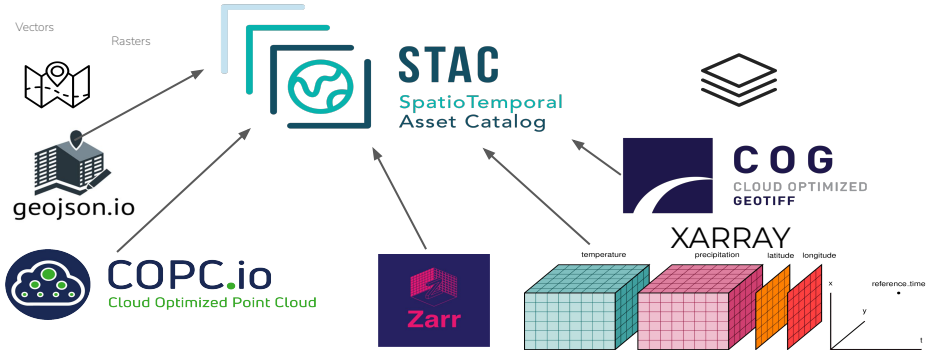
Pillars of cloud native science

- Open Source Software ecosystems now support almost all research use cases
- Open Science Initiatives are just starting, get involved now

GitHub Student Developer Pack
https://education.github.com/

THE CARPENTRIES
https://carpentries.org/

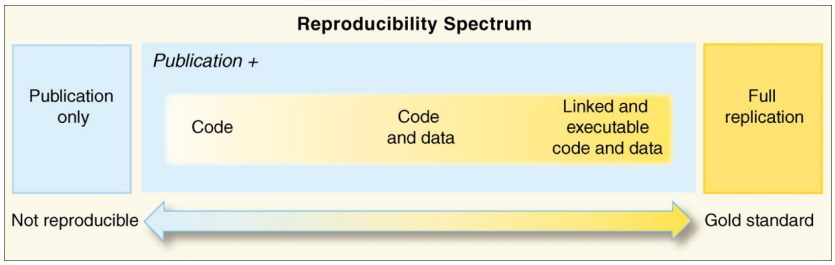
NASA TOPS
https://learnopenscience.github.io/



- STAC Catalogs help you find cloud native data types
- "Cloud Optimized" means data can be viewed or streamed dynamically over the internet (without needing to download them)

Are you ready to be an Open Scientist?

- Reproducibility & Replicability
- Free & Open Source Software
- Taking advantage of pre-print servers
- Publishing in Open Access Journals
- Data are FAIR & CARE compliant



Peng 2011 Science 10.1126/science.1213847

open source initiative

OPEN ACCESS

Findable Accessible Interoperable Reusable

https://www.go-fair.org/

CARE Principles for Indigenous Data Governance

https://www.gida-global.org/care