THE UNIVERSITY OF TEXAS AT EL PASO

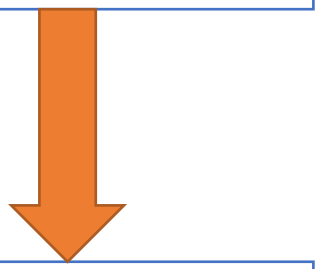
# F.A.I.R. PRINCIPLES OF DATA SCIENCE
Creating Open-Source Research for Collaboration and Publication

# What is Open Science?

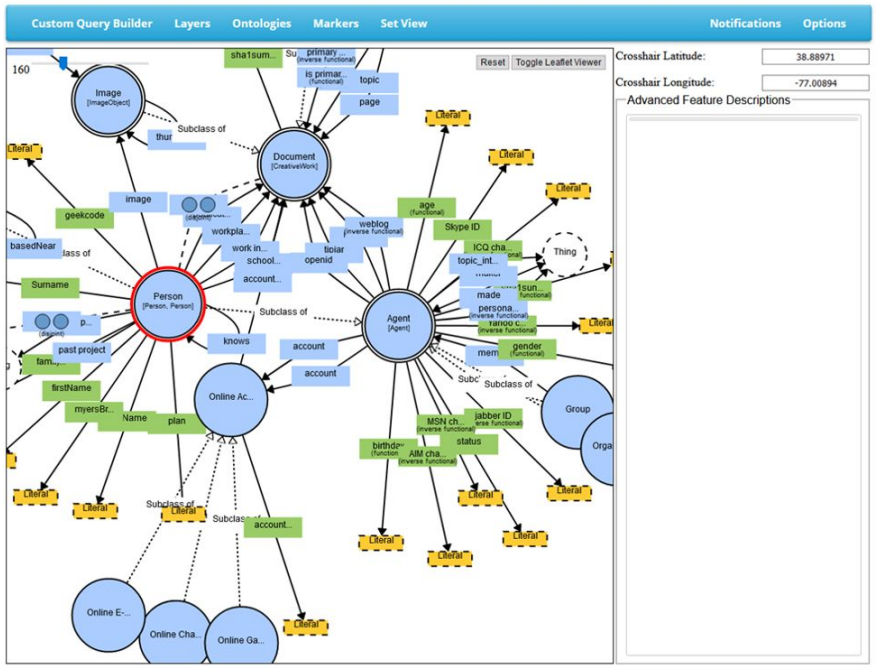
Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods.

https://www.fosteropenscience.eu/foster-taxonomy/open-science-definition

DATA.XLSX



JOURNAL ARTICLE




(Credit: Tanner Fry. Public domain.)
https://www.usgs.gov/media/images/varankaontologyviewsmall

# F.A.I.R. PRINCIPLES

Findable
Accessible
Interoperable
Reuseable

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

**METADATA**


<meta name="citation_journal_title" content="Geophysical Research Letters">
<meta name="citation_title" content="Intensified dust storm activity and Valley fever infection in the southwestern United States">
<meta name="citation_keywords" content="dust">
<meta name="citation_keywords" content="Valley fever">
<meta name="citation_keywords" content="climate">
<meta name="citation_keywords" content="air quality">
<meta name="citation_keywords" content="aerosol">
<meta name="citation_keywords" content="health">
<meta name="citation_volume" content="44">
<meta name="citation_issue" content="9">
<meta name="citation_firstpage" content="4304">
<meta name="citation_lastpage" content="4312">
<meta name="citation_publication_date" content="2017/05/16">
<meta name="citation_online_date" content="2017/05/06">
<meta name="citation_issn" content="1944-8007">
<meta name="citation_language" content="en">
<meta name="citation_author" content="Daniel Q. Tong">
<meta name="citation_author_institution" content="Center for Spatial Information Science and Systems George Mason University Fairfax Virginia USA">
<meta name="citation_author_institution" content="Air Resources Laboratory National Oceanic and Atmospheric Administration College Park Maryland USA">
<meta name="citation_author_institution" content="Cooperative Institute of Climate and Satellite University of Maryland College Park Maryland USA">
<meta name="citation_author" content="Julian X. L. Wang">
<meta name="citation_author_institution" content="Air Resources Laboratory National Oceanic and Atmospheric Administration College Park Maryland USA">
<meta name="citation_author" content="Thomas E. Gill">
<meta name="citation_author_institution" content="Department of Geological Sciences University of Texas at El Paso El Paso Texas USA">
<meta name="citation_author" content="Hang Lei">
<meta name="citation_author_institution" content="Center for Spatial Information Science and Systems George Mason University Fairfax Virginia USA">
<meta name="citation_author_institution" content="Air Resources Laboratory National Oceanic and Atmospheric Administration College Park Maryland USA">
<meta name="citation_author" content="Binyu Wang">
<meta name="citation_author_institution" content="Center for Spatial Information Science and Systems George Mason University Fairfax Virginia USA">
<meta name="citation_abstract_html_url" content="https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2017GL073524">
<meta name="citation_fulltext_html_url" content="https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017GL073524">
<meta name="citation_pdf_url" content="https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1002/2017GL073524">
<meta name="citation_publisher" content="John Wiley & Sons, Ltd"><meta name="citation_fulltext_world_readable" content=""/>
<meta name="article_references" content="
 Tong, D. Q., Wang, J. X. L., Gill, T. E., Lei, H., and Wang, B. (2017), Intensified dust storm activity and Valley fever infection in the southwestern United States, Geophys. Res. Lett., 44, 4304– 4312, doi:10.1002/2017GL073524.
">
<meta name="epdf_available" content="false">
<meta name="Description" content="Abstract Climate models have consistently projected a drying trend in the southwestern United States, aiding speculation of increasing dust storms in this region. Long‐term climatology is essential...">

<title>Intensified dust storm activity and Valley fever infection in the southwestern United States - Tong - 2017 - Geophysical Research Letters - Wiley Online Library</title>

https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2017GL073524

# PROJECT WORKFLOW

1. OBTAIN ORCID iD
   - https://orcid.org/

2. OBTAIN A DATA MANAGEMENT CHECKLIST
   - https://www.usgs.gov/products/data-and-tools/data-management/data-management-plans

3. HAVE A MEETING

4. DISCUSS LICENCE ISSUES

5. EXECUTE

# F.A.I.R. DATA MANAGEMENT FOR OPEN SOURCE

## What, where, and how are you going to put stuff?

## DATA FORMAT

### Geospacial

GML, GeoTIFF, DBF

### Text

geojson, csv

Sustainable Digital File Formats from the Library of Congress
https://www.loc.gov/preservation/digital/formats/fdd/descriptions.shtml

### USGS

Data dictionary
https://pubs.usgs.gov/of/2003/of03-001/htmldocs/datadict.htm
Metadata Wizard
https://www.usgs.gov/software/metadata-wizard-20

## DATA REPOSITORIES

Zenodo
Figshare
Mendelay
OSF

https://zenodo.org/record/3946720#.YFsu-q9KhjV
https://fairsharing.org/collection/GeneralRepositoryComparison

# F.A.I.R. DATA MANAGEMENT FOR OPEN SOURCE

## What, where, and how are you going to put stuff?

## AVAILABLE METADATA

### USGS

Data dictionary
https://pubs.usgs.gov/of/2003/of03-001/htmldocs/datadict.htm
Metadata Wizard
https://www.usgs.gov/software/metadata-wizard-20

# GeoJSON vs CSV

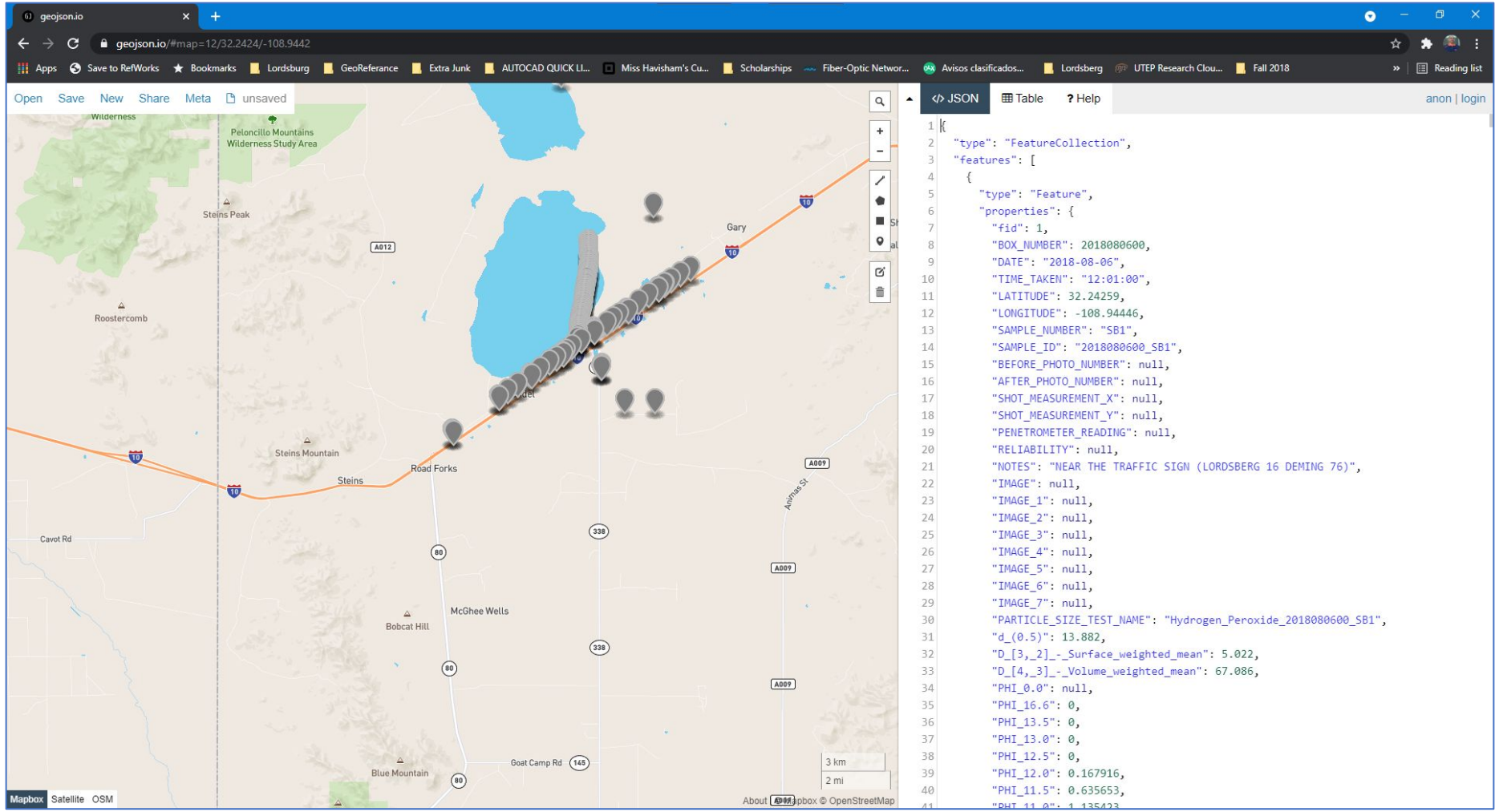
## Dataset

386 lines of sample data containing: Locations (Logitude, Latitude in WGS84 datum), Images, Penetrometer readings, Shot measurements, Notes, and Particle size measurements (Weighted averages)

| | GeoJSON | CSV |
|---|---|---|
| Form | Java Script Object Notation | Comma Separated Values |
| Data Size | 525KB | 114 KB |
| Hierarchial | Data has a hierarchy that can use dictionaries and lists while using python or QGIS | Not able to show Hierarchy |
| Extensions | .geojson or .geojson-ld | .csv or .geocsv |
| Scalability | Very Scalable | No support for Scalability |

Other formats can be found from the Open Geospatial Consortium (OGC)
https://www.ogc.org/docs/is

# GeoJSON vs CSV




https://geojson.io

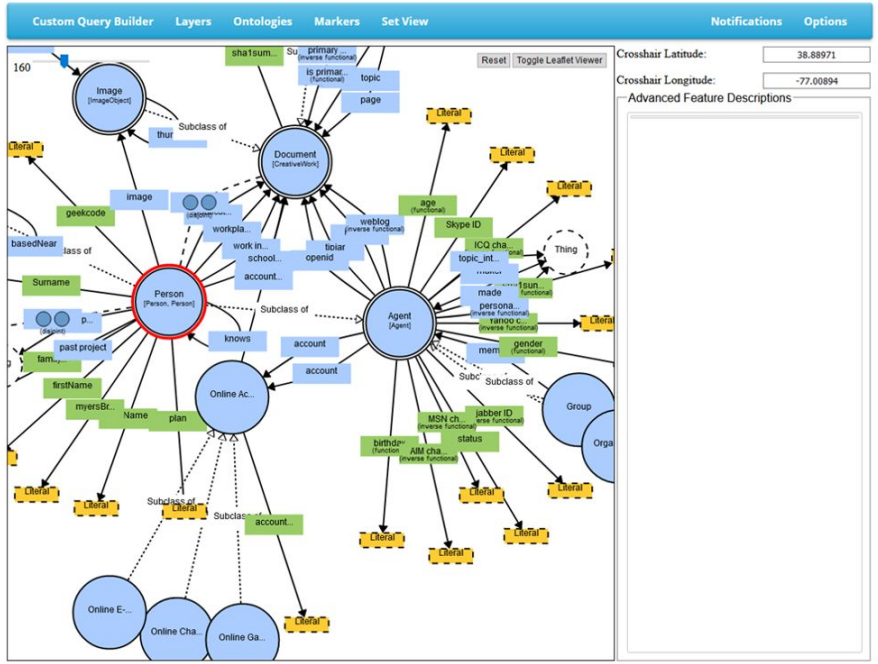
# LINKED DATA

The term “Linked Data” refers to a set of best practices for publishing and connecting structured data on the Web. These best practices have been adopted by an increasing number of data providers over the last three years, leading to the creation of a global data space containing billions of assertions— the Web of Data.

Bizer, C., Heath, T., & Berners-Lee, T. (2009). Linked Data - The Story So Far. *Int. J. Semantic Web Inf. Syst., 5*, 1-22.

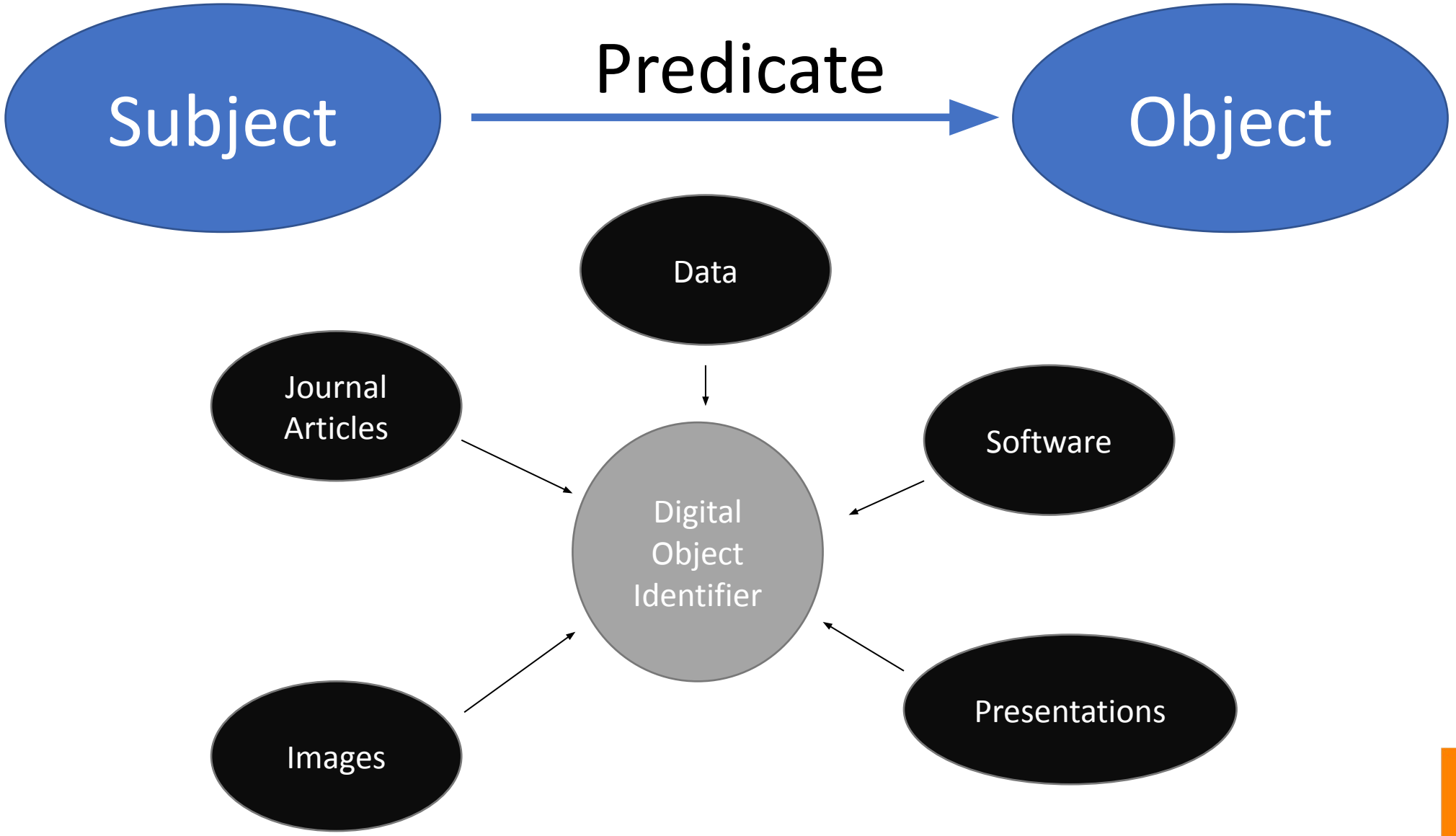
DATA.XLSX

JOURNAL ARTICLE




(Credit: Tanner Fry. Public domain.)
https://www.usgs.gov/media/images/varankaontologyviewsmall

# LINKED DATA




https://www.w3.org/wiki/GeoRDF

# Works Cited

Wilkinson, M. D. *et al.* The FAIR Guiding Principles for scientific data management and stewardship. *Sci. Data* 3:160018 doi: 10.1038/sdata.2016.18 (2016).