Overview of Webification

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What can webification do for me ?

* Web service to inspect, slice and dice satellite records !
  * Inspect a single variable in a granule
  * Quickly review metadata contents
  * Subsample the data in space dimension
  * Extract a long time series of data for a specific region
  * Filter and extract variables of interest based on quality flags as netCDF files
  * Both machine and human friendly
  * … any piece of information from a science data store can be directly accessed, through a unique and meaningful URL …..

…….One w10n URL is worth a thousand lines of code.

Webification

* Webification
  * AKA: Webification-science or w10-sci (for scientific arrays)
* Web Service protocol for subsetting, data and metadata extraction
* This presentation will focus on the front end capabilities of w10n-sci for satellite data

* ***Philosophy: Everything is a URL… …***
  * A directory branch
  * A granule
  * A variable inside a granule
  * A piece of metadata inside a variable
* Powerful capabilities
  * Subset-by-value: A variable subsetted based on the contents of other variables
  * Outputs in user friendly JSON and netCDF
  * Built on NumPy: fast server side execution
  * Can "proxy" other web services like OPeNDAP
  * Doesn't matter: Level 1, Level 2, Level 3 or Level 4 data

W10n-sci Syntax

* W10n-sci syntax can be long but always resolves to form a URL as follows:
  * http://host:port/path/store/identifier?queryString
  * String /identifier identifies
    * *meta info of a node or leaf* by ending with a forward slash '/', e.g., /sea_surface_temperature/or
    * *data info of a leaf* by ending with an enclosing square-bracket pair '**[...]**', e.g., /sea_surface_temperature**[0:1:1,0:2030:10,0:1354:10]**
  * String ?queryString indicates how the request should be done, such as, in what output format data of a leaf should be returned.

Two server flavors of webifcation

* **Pomegranate** is a reference implementations of w10n-sci in Python and supports data formats commonly used in Earth science: HDF 4 and 5, all versions of netCDF, etc. Pomegranate is open source software.
* **Juneplum** is a special implementation of w10n-sci in Java. It is also open source software

PO.DAAC webification

* All PO.DAAC data has been ”webified”
  * https://podaac-w10n.jpl.nasa.gov/allData/
* The ACCESS developed Virtual Quality Screening Service (VQSS) uses w10n-sci for the backend
  * https://podaac-access.jpl.nasa.gov
* Other NASA w10n servers exists

Future recipe

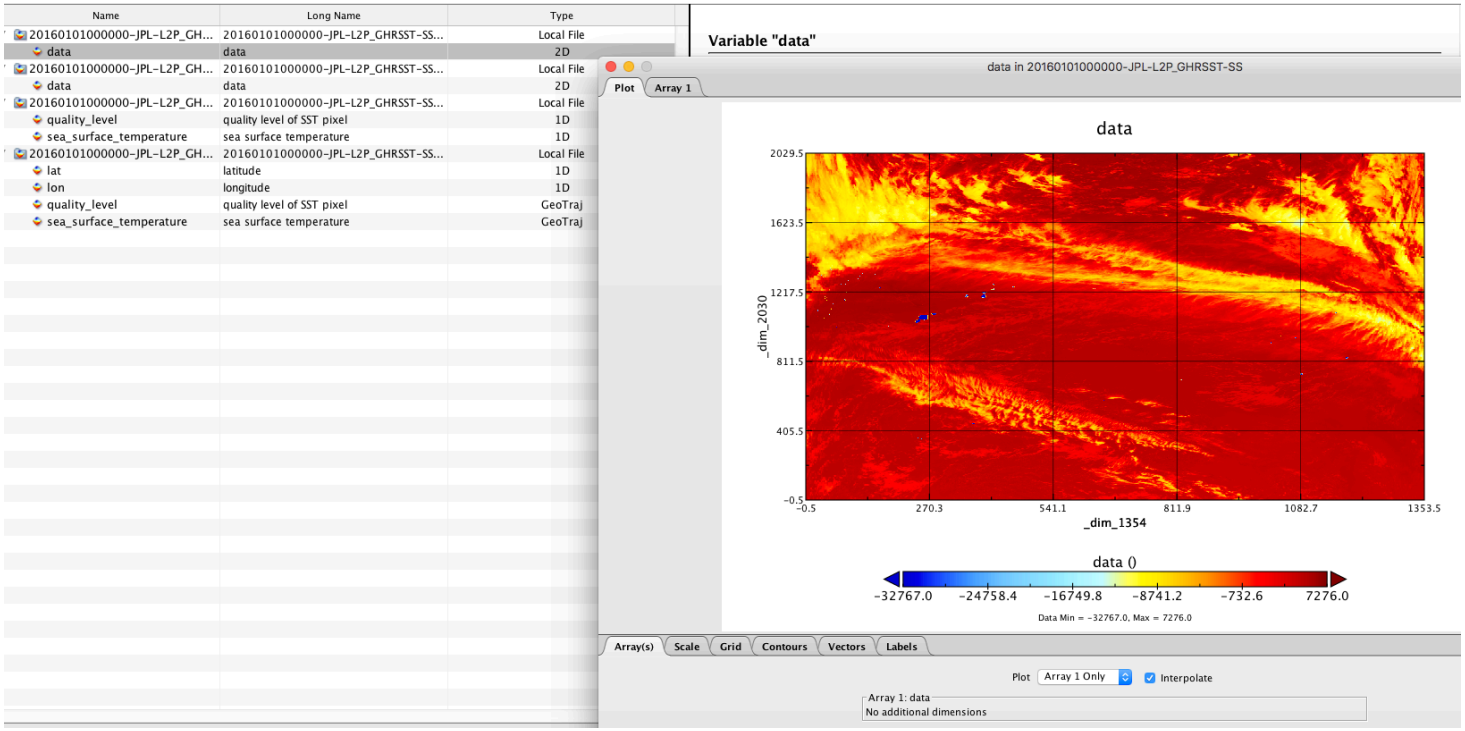
* Python based webification recipe
  * Subset a years worth of GHRSST MODIS Aqua Level 2 SST data over a 0.02x0.02 decimal degree box in Gulf of Mexico screened by highest quality flag
    * 1 km, 100 of granules
    * I know which granules to operate on based on a discovery request

Examples

* Directory and Granule exposure
* Granule metadata
* Granule data extraction
  * Entire array, by stride, by value
  * Different data outputs
* https://podaac-w10n.jpl.nasa.gov/howto/

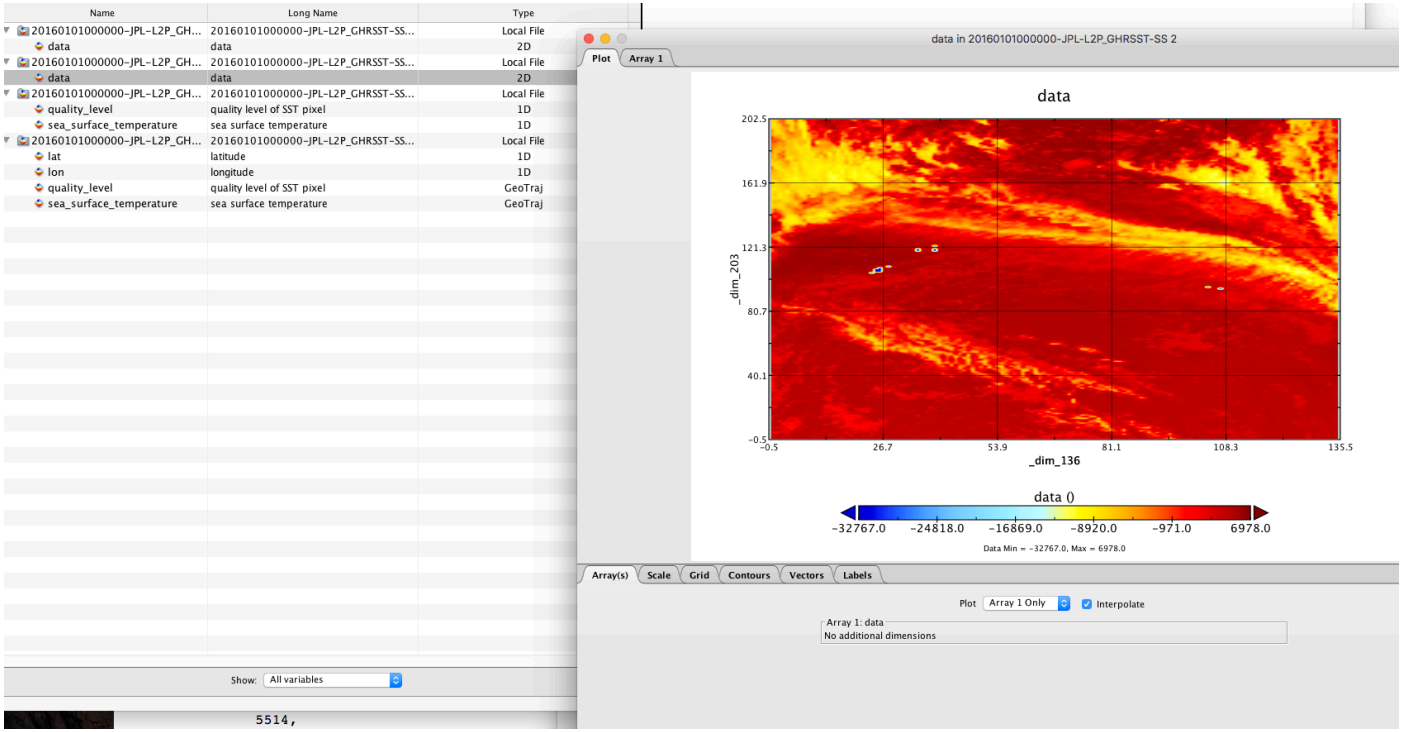
SST MODIS granule

https://.../20160101000000-JPL-L2P_GHRSST-SSTskin-MODIS_A-D-v02.0-fv01.0.nc/**sea_surface_temperature[]?output=nc**



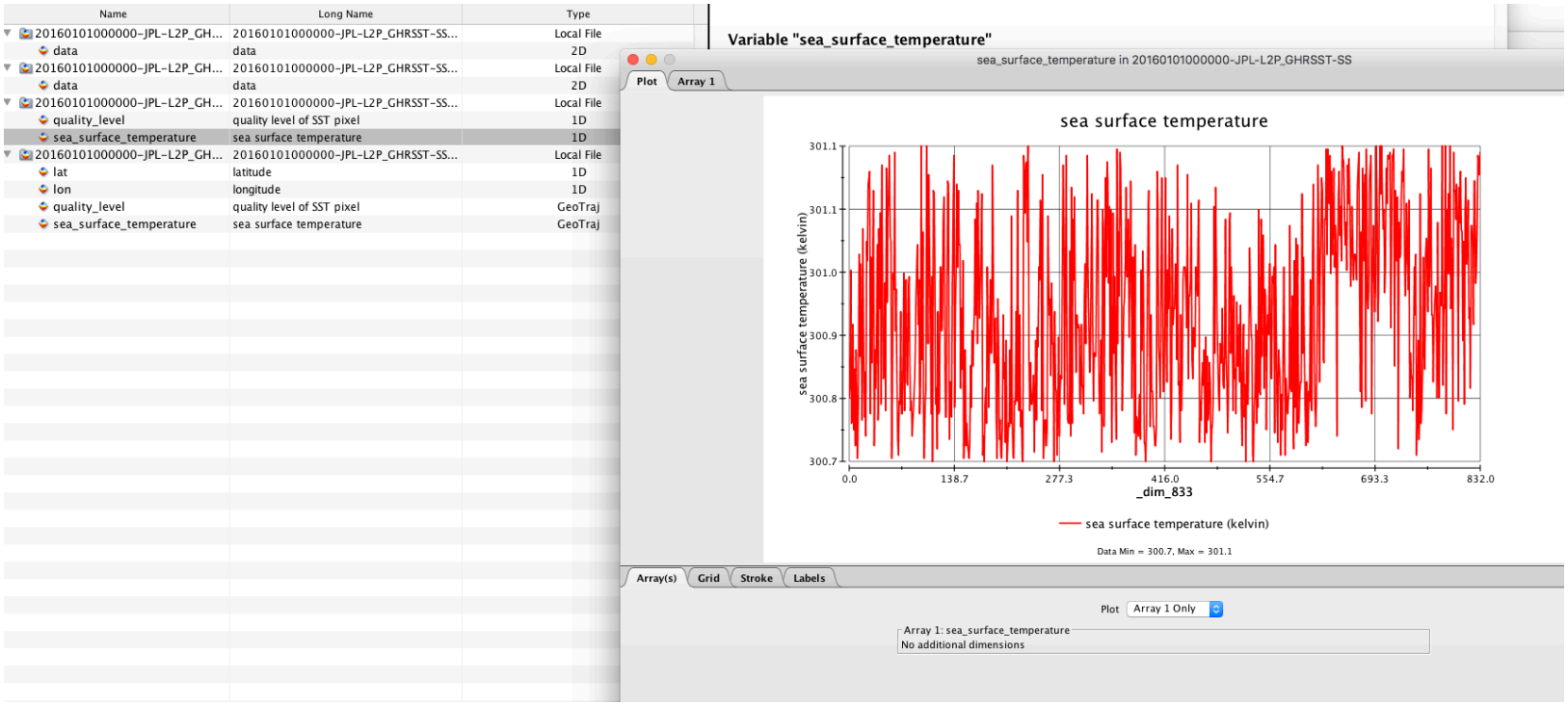
Stride by 10

https://podaac-w10n.jpl.nasa.gov/allData/ghrsst/data/GDS2/L2P/MODIS_A/JPL/v2014.0/2016/001/20160101000000-JPL-L2P_GHRSST-SSTskin-MODIS_A-D-v02.0-fv01.0.nc/**sea_surface_temperature[0:1:1,0:2030:10,0:1354:10]?output=nc**



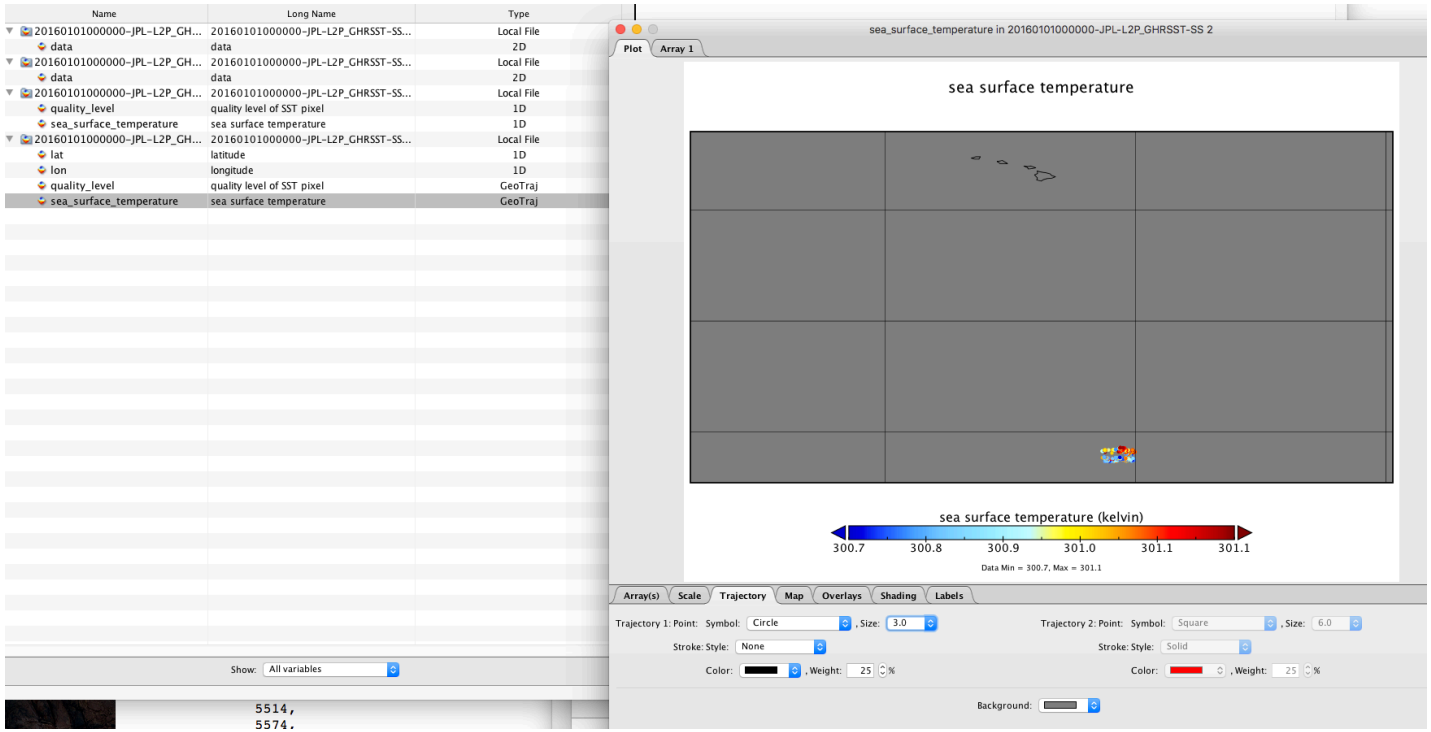
Just quality = 5 (best)

https://.../20160101000000-JPL-L2P_GHRSST-SSTskin-MODIS_A-D-v02.0-fv01.0.nc/{sea_surface_temperature,quality_level}/[0<sea_surface_temperature≤100,-19≤lat≤-17,-152≤lon≤-150,quality_level==5]?output=nc



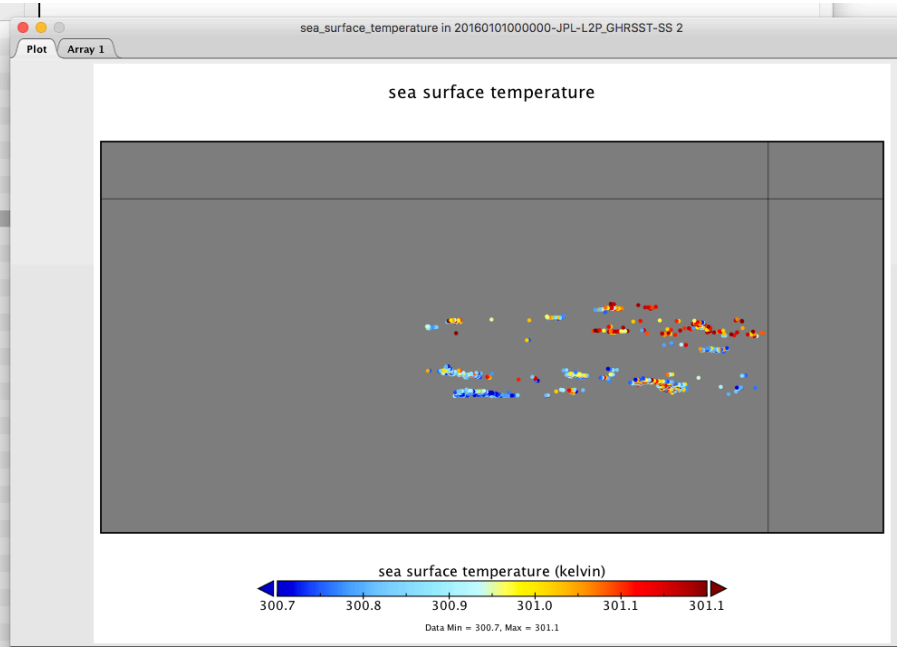
Just quality = 5 (best) as a map

https://.../20160101000000-JPL-L2P_GHRSST-SSTskin-MODIS_A-D-v02.0-fv01.0.nc/{sea_surface_temperature,lat, lon, quality_level}/[0<sea_surface_temperature≤100,-19≤lat≤-17,-152≤lon≤-150,quality_level==5]?output=nc



Just quality = 5 (best) as a map

Name	Long Name	Type
20160101000000-JPL-L2P_GH...	20160101000000-JPL-L2P_GHRSST-SS...	Local File
data	data	2D
20160101000000-JPL-L2P_GH...	20160101000000-JPL-L2P_GHRSST-SS...	Local File
data	data	2D
20160101000000-JPL-L2P_GH...	20160101000000-JPL-L2P_GHRSST-SS...	Local File
quality_level	quality level of SST pixel	1D
sea_surface_temperature	sea surface temperature	1D
20160101000000-JPL-L2P_GH...	20160101000000-JPL-L2P_GHRSST-SS...	Local File
lat	latitude	1D
lon	longitude	1D
quality_level	quality level of SST pixel	GeoTraj
sea_surface_temperature	sea surface temperature	GeoTraj



Additional Resources

* Whitepaper documentation
  * More documentation of specification, examples and comparisons to other services

Backup -- Advanced Examples

* Subset by bit flags values