



IN51A-03

Streamlining Access to Satellite Level 2 Data

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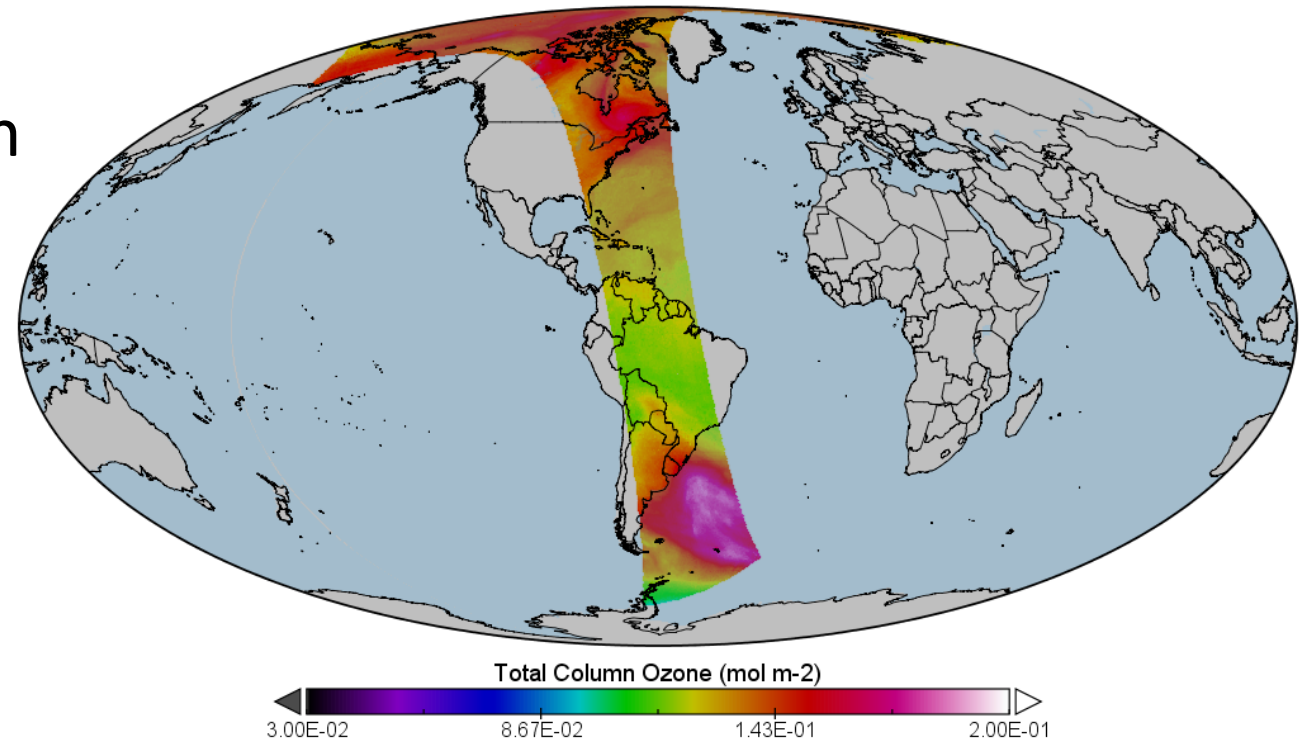
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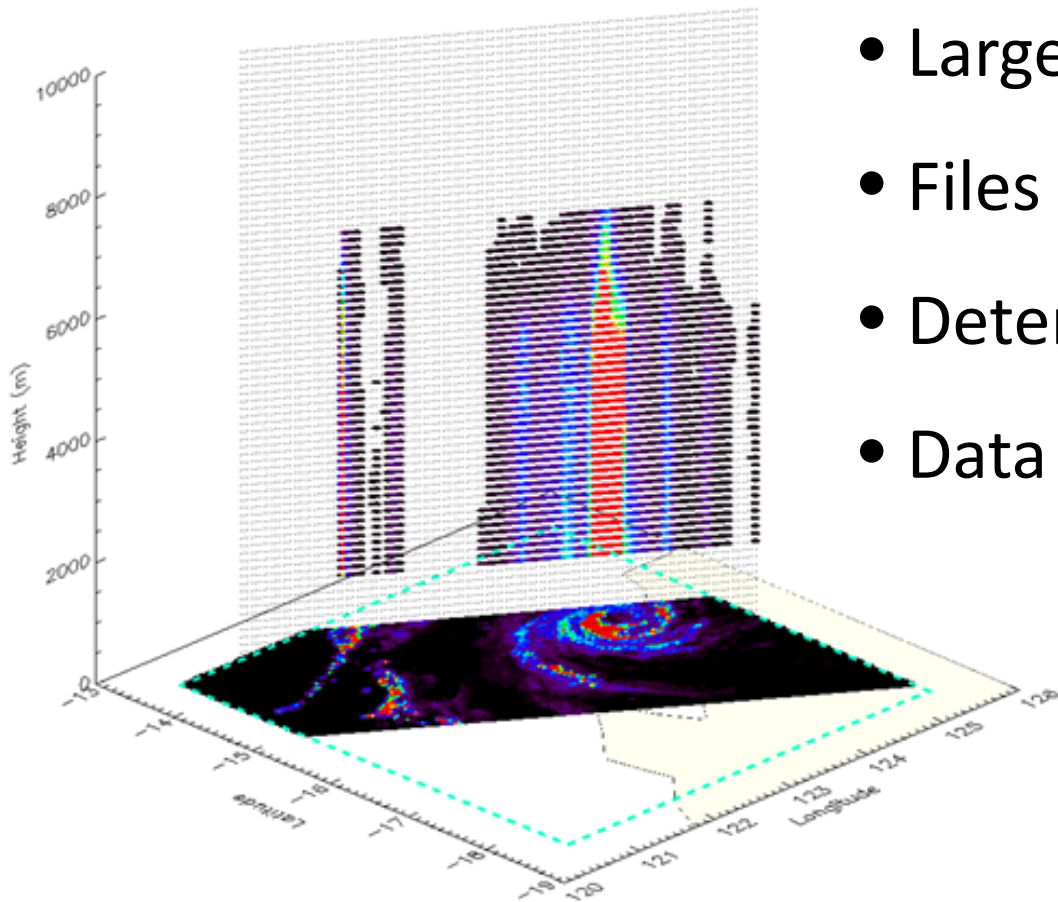
Level 2 Satellite Data

- Derived geophysical variables at the same resolution and location as the instrument source data
- Satellite observation geometry
- Products are geospatially and temporally referenced by variables (no grid dimensions)

S5P TROPOMI Total Ozone Column
2019-08-03



Level 2 Data Access Challenges

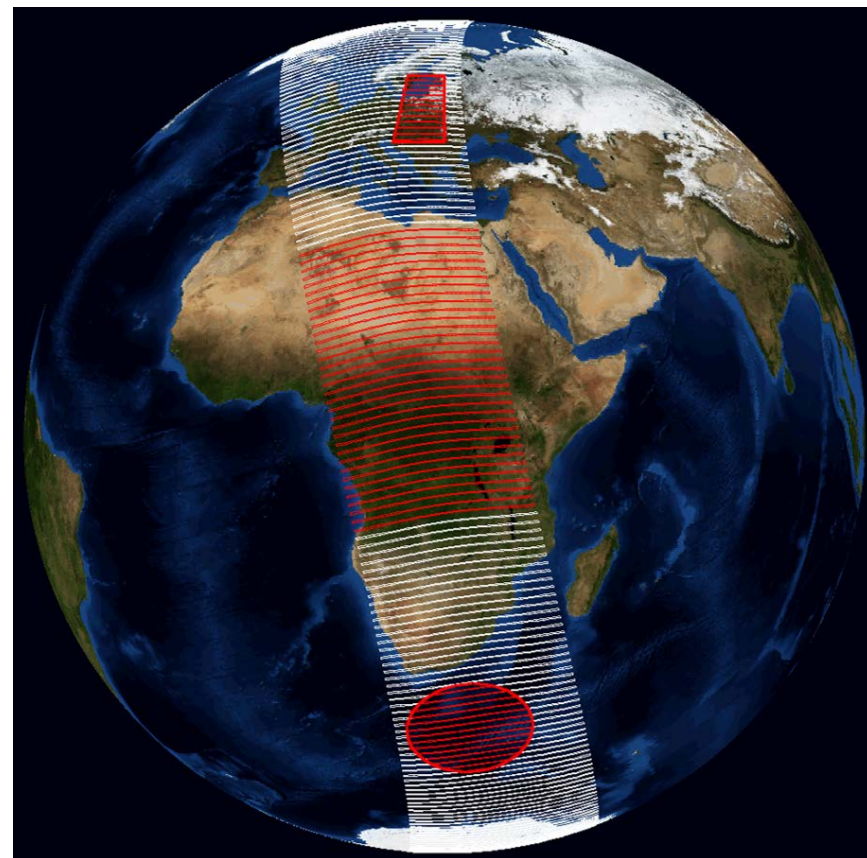


- Large File Sizes (>100MB)
- Files contain multiple swaths / instruments / orbits
- Determining required variables
- Data extraction within region of interest



GES DISC Level 2 Subsetting Service

- Allows users to select desired variables, spatial domains, time slices, and dimensions
- Streamlines file layout and contents
- Eliminates need to download entire file
- Reduces file size
- Saves storage and bandwidth resources





Level 2 Subsetter Interface

Get OMI/Aura Sulphur Dioxide (SO₂) Total Column 1-orbit L2 Swath 13x24 km V003 data

Estimated size of results
5,543 days, 80,928 links, 2.9 TB

Refine Search ?

▶ **Refine Date Range:** 2004-10-01 00:00:00 to 2019-12-04 23:59:59 Reset

Subset Options ?

▶ **Spatial Subset:** -180, -90, 180, 90 Reset

▶ **Variables:** Get all variables Reset

▶ **Dimensions:** Get all dimensions Reset

▶ **Time of Day:** None Reset

▶ **Data Presentation:** CROP Reset

Output format ?

▶ **File Format:** HDF-EOS5 Reset

Reset All Get Data

GES DISC
Atmospheric Composition, Water

Data Collecti

Refine By

Subject Sort ▾
 Atmospheric Chemistry (3)

Measurement Sort ▾
 Sulfur Dioxide (1)

Source Sort ▾
 Aura OMI (3)

Processing Level Sort ▾
 2 (2)
 3 (1)

Project Sort ▾
 ATDD (1)
 Aura (2)

Feedback Help ▾ Login

Feedback icons: Twitter, YouTube, RSS, Chat

Begin Date ⇅ End Date ⇅

Begin Date	End Date
2004-10-01	2019-12-04
2004-10-01	2019-12-04

OMI/Aura Formaldehyde Aura OMI 003 1 day 0.1 ° x 0.1 ° 3 2004-10-01 2019-12-05



File Search

▼ Refine Date Range: 2004-10-01 00:00:00 to 2019-12-05 23:59:59

From:

To:

Available Range: 2004-10-01 00:00:00 to 2019-12-05 23:59:59

October 2004						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	01	02
03	04	05	06	07	08	09
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	01	02	03	04	05	06

December 2019						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	01	02	03	04
05	06	07	08	09	10	11

- Select any temporal range over the mission duration
- Subset links are generated for each granule containing data within the subset parameters




Spatial Subsetting

Lat/Lon Box

Spatial Subset: ✓ -130, 12, -65, 52

-130,12,-65,52




Available Range: -180, -90, 180, 90 Cursor Coordinates: 71.086, -169.098

Radial

Spatial Subset: ✓ 39, -77, 500.000 km

39 -77 500 km




Available Range: -180, -90, 180, 90 Cursor Coordinates: 48.457, -91.933

Point

Spatial Subset: ✓ 39, -77

39 -77



Available Range: -180, -90, 180, 90 Cursor Coordinates: 49.061, -101.073



Temporal Subsetting

Date ranges may be narrowed down by:

▼ Refine Date Range: 2019-08-06 00:00:00 to 2019-11-30 23:59:59 Reset

From: To:

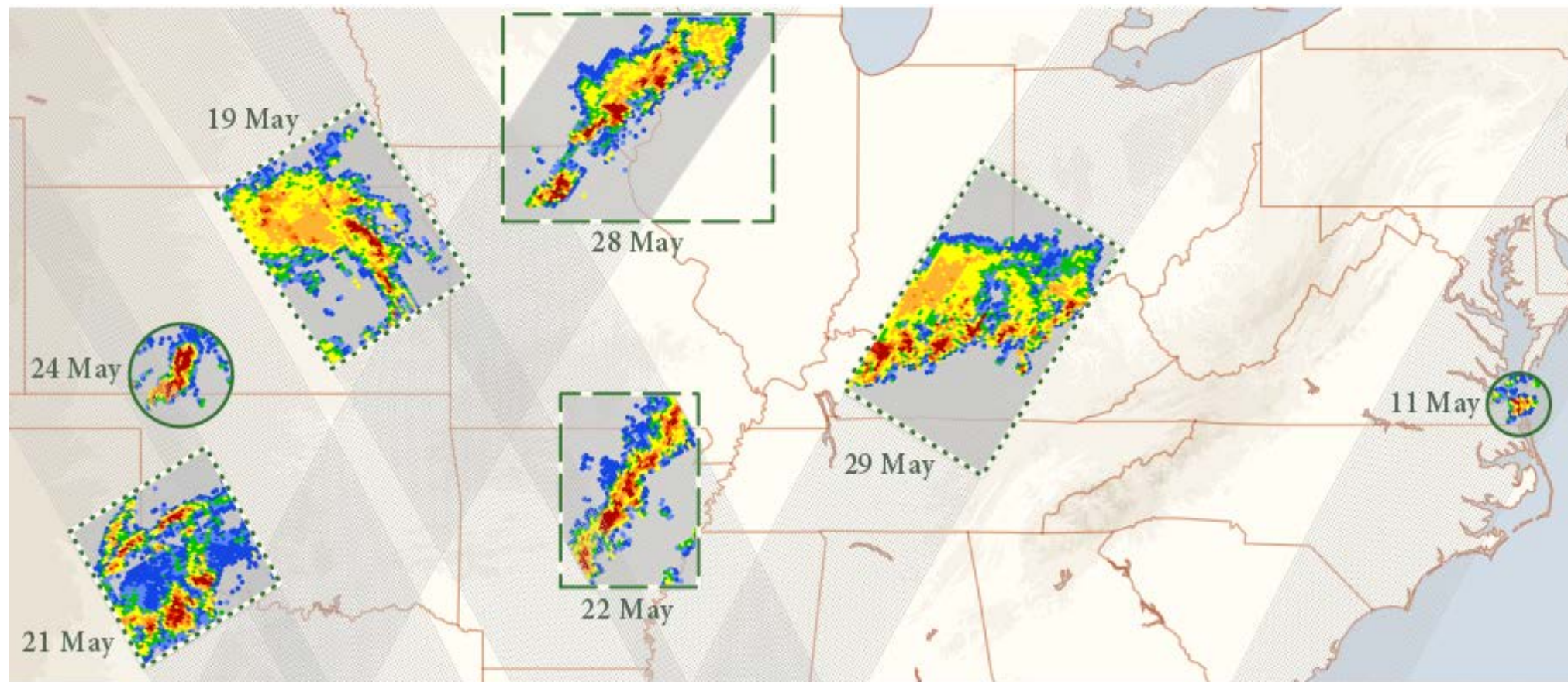
Diurnal (Time of Day) subsets are also supported:

▼ Time of Day: ✓ 16:00:00 to 18:30:00 Reset

☉ From: ☉ To:

18 : **30** : **00**

Radial, Box, & Temporal Subsetting



GPM Dual-Frequency Precipitation Radar (DPR) observations during tornado outbreaks in May 2019.



Variable Selection

- Any number of variables
- Select groups
- Display variable name and description
- File structure view
- Required variables automatically selected and included by the service
 - Geospatial
 - Temporal
 - Etc.

▼ Variables: Get all variables Reset

NOTE: By default, **ALL** variables are sent in the subset request.

Collapse Tree

- HDFEOS
 - SWATHS
 - OMI Total Column Amount SO2
 - Data Fields
 - Geolocation Fields
 - GroundPixelQualityFlags (Ground Pixel Quality Flags)
 - RelativeAzimuthAngle (Relative Azimuth Angle (sun + 180 - view))
 - SecondsInDay (Seconds after UTC midnight)
 - SolarAzimuthAngle (Solar Azimuth Angle)
 - SolarZenithAngle (Solar Zenith Angle)
 - SpacecraftAltitude (Spacecraft Altitude)
 - SpacecraftLatitude (Spacecraft Latitude)
 - SpacecraftLongitude (Spacecraft Longitude)
 - TerrainHeight (Terrain Height)
 - ViewingAzimuthAngle (Viewing Azimuth Angle)
 - ViewingZenithAngle (Viewing Zenith Angle)



Dimensional Subsetting

- Any number of dimension indices
- Display dimension indices and value (where appropriate)
- File structure view

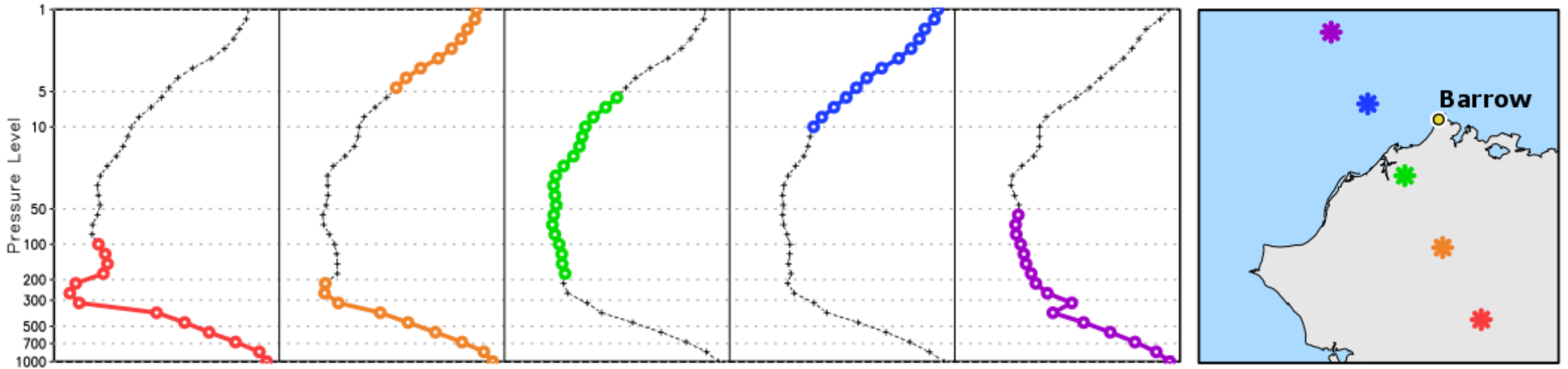
▼ Dimensions: Get all dimensions Reset

NOTE: By default, **ALL** dimensions are sent in the subset request.

Collapse Tree

- HDFEOS
 - SWATHS
 - OMI Total Column Amount SO2
 - nLayers
 - nWavel
 - 1 (308.7nm)
 - 2 (310.8nm)
 - 3 (311.85nm)
 - 4 (312.61nm)
 - 5 (313.2nm)
 - 6 (314.4nm)
 - 7 (317.62nm)
 - 8 (322.42nm)
 - 9 (331.34nm)
 - 10 (345.4nm)
 - 11 (360.15nm)
 - 12 (372.8nm)

Dimensional Subsetting



Pressure Level subsets of Temperature observations from five MLS soundings



Refactoring the Data Presentation

Three different ways
to get subset results:

▼ **Data Presentation:** CROP

- VECTOR: Spatial dimensions will be reduced to a single data stream dimension.
- CROP: Spatial dimensions will be trimmed to data. (Default)
- FULL: Spatial dimensions will remain at original lengths.

Crop (Default)

- File is trimmed to region of interest

Full

- File is not trimmed and data outside subset region are set to “missing”

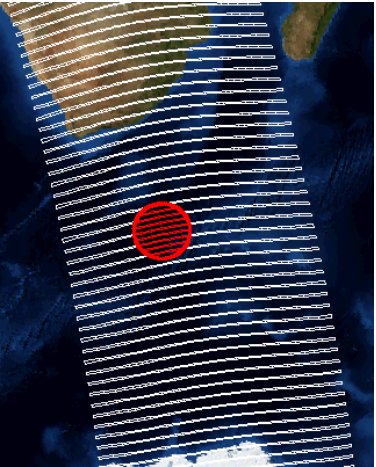
Vector

- Most Compact: Spatial dimensions collapsed into time-ordered 1D array

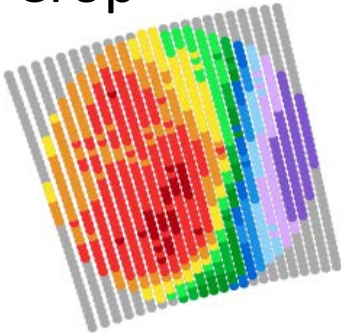


Refactoring a Radial Subset Result

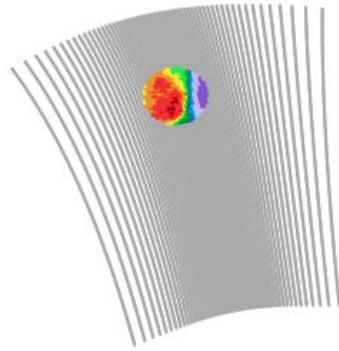
Radial Subset



Crop

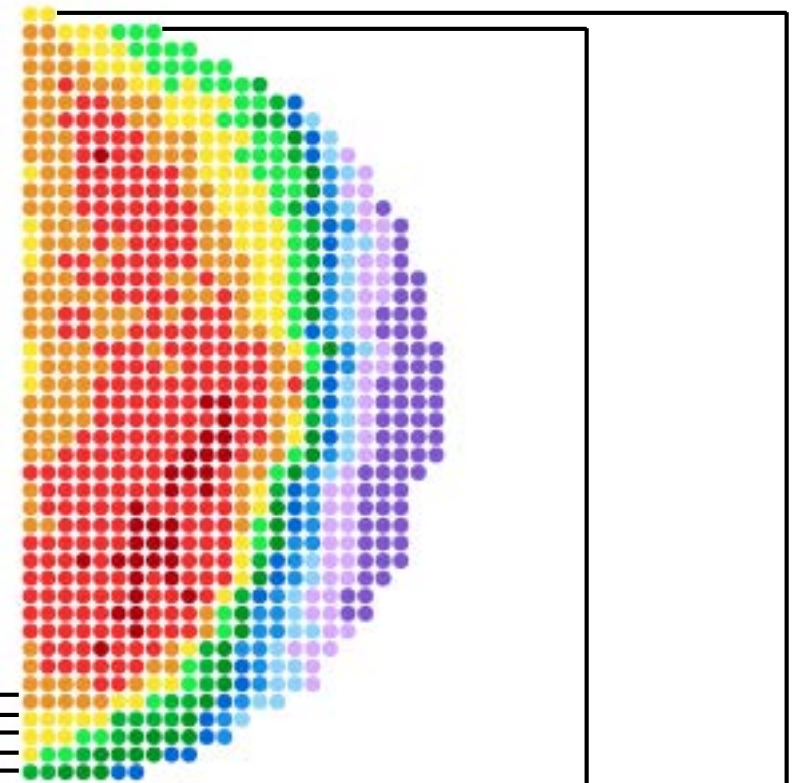


Full

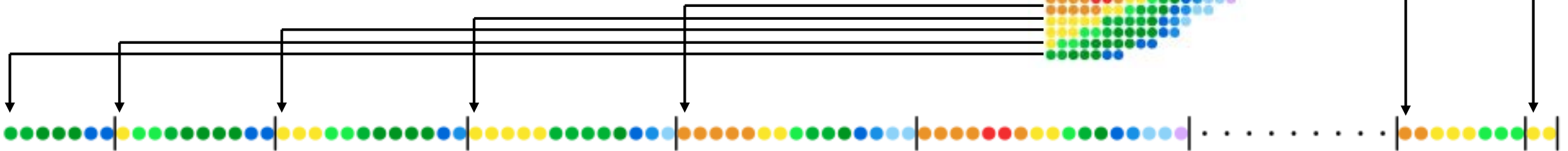


Vector

Missing values trimmed



Data rows repositioned into 1-dimensional array





Upcoming Features

Output conversion of all products to netCDF4

- For all supported missions
- With CF-compliant metadata

▼ **File Format:** HDF-EOS5 Reset

HDF-EOS5 (Default)

netCDF

Addition of UTC time to all output products

- Users will not have to deal with complicated native time types







Supported Missions

- **OMI** (Aura Ozone Monitoring Instrument) – Original, Zoom, and L2G
- **MLS** (EOS Aura Microwave Limb Sounder)
- **OCO-2** (Orbiting Carbon Observatory) – Lite
- **ACOS** (Atmospheric CO₂ Observations from Space) – Lite
- **GPM** (Global Precipitation Measurement)
- **Sentinel-5P TROPOMI** (TROPOspheric Monitoring Instrument) – Original and HiRes
- (Coming Soon) **AIRS** (Atmospheric Infrared Sounder)
- (Coming Soon) **OCO-3** (Orbiting Carbon Observatory)



Application Program Interface

- No , , , , etc.
- Script-based access to Search and Subset services
- Works in Windows, Mac, and UNIX environments
- Supports asynchronous requests
- Documentation and code samples in “How-To” articles



Thank You

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