**CO₂ Data Distribution and Support from the Goddard Earth Science Data and Information Services Center (GES-DISC)**

*Thomas Hearty, Andrey Savtchenko, Bruce Vollmer, Arif Albayrak, Mike Theobald, Ed Esfandiari, Jennifer Wei*
Outline

- Process for Tracking User Queries
- Immediate needs in preparation for the OCO-2 Level 2 data release
  - Level 2 Files
  - Documentation
  - Guidance for Versions
  - ACOS update
- CO$_2$ data distribution metrics: ACOS, AIRS, and OCO-2
- Existing and possible future data services

The questions posed in this presentation can be addressed in followup emails and telecons
User Queries regarding OCO-2 we have received so far are typical

- Where is the data?
- What are the units?
- What is the difference between AIRS and OCO-2?
- Can I do ____ with the data?
• *Is there a person(s) on the science team through whom we should route questions?*
Immediate needs in preparation for OCO-2 Level 2 release

- Level 2 Files
- Documentation
- Guidance for Versions
- ACOS update
The previous test data flows with ACOS and OCO-2 Level 1 files have worked well. We want to continue the same process for the Level 2 release.

So far, we have only tested the data flow for the OCO2_L2_IMAPDOAS files.

We request at least two weeks lead time to exercise our system prior to the public release.

When will we get the OCO2_L2_Diagnostic and OCO2_L2_Standard files?

Will the Lite product be an official product?

Who are the intended users of the Lite product?
As the products evolve we can easily add or modify existing data description documents.

We find it helpful to send documents to multiple people at the GES-DISC in case anyone is not available. At a minimum documents should be sent to Bruce.Vollmer@nasa.gov and Andrey.Savtchenko@nasa.gov.

We will always respond with an email confirming that we put the documents on the web.

We have not received any documentation regarding the Lite Product.
Are these the correct Versions for the Data release?

- Data Quality Statement, **Known Issues as of December 19, 2014**
- Interface Spec for Attitude Product, **November 18, 2014**
- Interface Spec for Ephemeris Product, **November 18, 2014**
- Interface Spec for L1A Instrument Product, **November 18, 2014**
- Interface Spec for L1B Product, **November 18, 2014**
- Level 1B ATBD, **December 30, 2014**
- Level 2 ATBD, **May 2014**
- IMAP-DOAS preprocessor, **April 1, 2014**
- Oxygen-A Band Cloud Screening Algorithm (ABO2) ATBD, **August 21, 2014**
Currently we are offering Version 5 starting from **December 14, 2014**.

**Will there be any changes to the mission start date?**

**Will there be a new Version of the Level 1b with the Level 2 release?**
We support at most 2 concurrent versions.

Will there be Version 6 and 6R that do not overlap or Versions 5 and 6?

Calibration status may be better managed using metadata.

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**Guidance on Versions**

- We support at most 2 concurrent versions.
- Will there be Version 6 and 6R that do not overlap or Versions 5 and 6?
- Calibration status may be better managed using metadata.

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**OCO-2 MISSION**

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**Data Holdings**

- Known data Issues

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**Level 0 and Level 1**

<table>
<thead>
<tr>
<th>Product</th>
<th>Long Name</th>
<th>Level</th>
<th>Data Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCO2_Att</td>
<td>OCO-2 spacecraft attitude data</td>
<td>0</td>
<td>access</td>
</tr>
<tr>
<td>OCO2_Eph</td>
<td>OCO-2 spacecraft ephemerides</td>
<td>0</td>
<td>access</td>
</tr>
<tr>
<td>OCO2_L1ain_Sample</td>
<td>Collated, parsed, OCO-2 Science or Calibration Data</td>
<td>1A</td>
<td>access</td>
</tr>
<tr>
<td>OCO2_L1ain_Pixel</td>
<td>Collated, parsed, OCO-2 Calibration Data</td>
<td>1A</td>
<td>access</td>
</tr>
<tr>
<td>OCO2_L1B_Calibration</td>
<td>Calibrated, geolocated OCO-2 calibration spectra</td>
<td>1B</td>
<td>access</td>
</tr>
<tr>
<td>OCO2_L1B_Science</td>
<td>Calibrated, geolocated OCO-2 science spectra</td>
<td>1B</td>
<td>access</td>
</tr>
</tbody>
</table>

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**Level 2 (expected March, 2015)**

<table>
<thead>
<tr>
<th>Product</th>
<th>Long Name</th>
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</thead>
<tbody>
<tr>
<td>OCO2_L2_IMAPDOAS</td>
<td>OCO-2 Level 2 spatially ordered geolocated retrievals of XCO2 and fluorescence using the IMAP-DOAS algorithm</td>
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<tr>
<td>OCO2_L2_Diagnostic</td>
<td>OCO-2 Level 2 geolocated XCO2 retrieval results and algorithm diagnostic information</td>
<td>2</td>
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<tr>
<td>OCO2_L2_Standard</td>
<td>OCO-2 Level2 geolocated XCO2 retrievals results, physical model</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
**Guidance on ACOS Versions**

**Will there be a new version of the ACOS Level 2 product (V3.4 or V3.5)?**

**We are still distributing ACOS v3.3 data.**

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**ACOS Data**

GES DISC distributes the following data from the ACOS (Atmospheric CO2 Observations from Space) Task:

ACOS Level 2 geolocated retrieved CO2-column averaged dry air mole fraction for all soundings for which retrieval was attempted; physical model. *Algorithm Version 3.3.*

<table>
<thead>
<tr>
<th>Data Product Name</th>
<th>Description</th>
<th>Spatial Resolution</th>
<th>Temporal Coverage</th>
<th>Average Item Size (Mb)</th>
<th>Data Access</th>
</tr>
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<tbody>
<tr>
<td><strong>ACOS_L2S</strong></td>
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<tr>
<td>(3.3)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>ACOS Level 2 geolocated retrieved CO2-column averaged dry air mole fraction for all soundings for which retrieval was attempted; physical model. <em>Algorithm Version 3.3.</em></td>
<td>10.5 km @ nadir</td>
<td>2009-4-01 - forward</td>
<td>3</td>
<td>Mirador, ftp, OPeNDAP</td>
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<td></td>
<td></td>
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<tr>
<td>(2.9)</td>
<td></td>
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<td>10.5 km @ nadir</td>
<td>2009-4-05 2012-9-24</td>
<td>3</td>
<td>Mirador, ftp, OPeNDAP</td>
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</table>

*retrievals using SWIR radiances from the TANSO-FTS instrument on board GOSAT (IBUKI) satellite.
Distribution Metrics

- ACOS V2.9 and V3.3
- AIRS V5 Level 2
- AIRS V5 Level 3
- OCO-2 Level 1
People are still using **ACOS v3.3**

Inconsistency with **ACOS v3.4 or v3.5** may be confusing for users
Chris: Do you know how to paste Gilberto's sample presentation format into this Google Presentation?

Steve: See if this works. (GV)
The AIRS Level 3 data have more users than the Level 2 product.
Many users interact with the Level 3 data through Giovanni.
In the absence of an OCO-2 level 3 product perhaps it could be provided in Giovanni as a value added service.
OCo2 Level 1b Distribution Metrics

Already the OCO-2 Level 1b data has more users than the AIRS Level 2.
The external user locations plot is derived based on the latitude/longitude of the resolved locations of the unique user IPs over the designated time period for all OCO2 data products and distribution methods. The dot near Antarctica represents the users whose IP did not resolve to a location.
Existing and Possible Future Data Services

- Metadata Publication – Spatial Search
- MODIS Subsets along OCO-2 track
- ACOS WMS Service
- Custom Lite Product
- Colocation with AIRS, MERRA, or other data sets
Each granule is divided into \( \leq 25 \) polygons.
The corners are within \( \sim 0.5 \times \text{swath width} \) beyond actual data.
For one footprint in polygon box is \( 2 \times 2 \text{ km}^2 \).
The polygons overlap in target mode.
Collaboration with the OCO-2 Science team has enabled MODIS subsets along the OCO-2 track. These subsets are available on a rolling archive by subscription but are not currently advertised (outside of the science team meeting).
ACOS Web Map Service (WMS)

- WMS allows quick visualizations of gridded data using a browser or GoogleEarth
- We have implemented this for an unofficial gridded ACOS product for various quality screening Levels

**xCO2 from ACOS V3.3**

April 2011

April 2013
A virtual lite product can be achieved using OPeNDAP and the Simple Subset Wizard (SSW).

Aggregation can be provided by a data recipe or on-the-fly.
A) Map of AIRS CO with ACOS v3.4 footprints for 2010.08.06. The green circles passed the Quality tests.
B) AIRS CO is used to define clean and polluted scenes.
C) Histogram of ACOS v3.4 clean and polluted data from 2010.07.31 to 2010.08.15
D) Histogram of AIRS Clean and polluted data 2010.07.31 to 2010.08.15
Summary

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