



## OCO-2 Science Team Telecon

# OCO-2 Status and Plans February 2, 2016

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for the OCO-2 Science Team  
Jet Propulsion Laboratory,  
California Institute of Technology  
February 2, 2016

# Topics Covered

- **OCO-2 status update**
  - Observatory Status
  - Instrument Status
- **OCO-2 V7 data product delivery status**
- **Progress and plans for V8 testing**
  - Recent results (BRDF testing)
  - Near-term focus: Southern Hemisphere Glint Bias
- **OCO-2 plans for reprocessing GOSAT data**
- **Upcoming Meetings**
  - EGU, JpGU, IWGGMS-12

# Observatory Status

# OCO-2 Observatory Status

- The OCO-2 spacecraft operations are “NOMINAL”
  - The last drag make-up maneuver, DMUM#9 was executed on 12/30
  - Next drag make-up maneuver, DMUM#10, expected 11 February 2016 (in close coordination with CALIPSO DMUM on 11 February)
  - No Risk Mitigation Maneuvers this cycle, but one possible conjunction on 2/7 is currently being monitored
- The Navigation team is continuing to maintain excellent ground track overlap with CALIPSO and CloudSat
  - Swaths overlap within +/- 5 km >95% of the time since 8/4/2015
- Data Delivery Report:
  - As of 1/20/2016, the OCO-2 V7r and V7r Lite L2 and SIF products had been delivered to the GES DISC though the end of Nov 2015
  - No full days of data have been lost since Jan 1, 2016
  - The next instrument decontamination cycle is scheduled for early March 2016. As in the past, that will preclude data acquisition for about one week

# OCO-2 B7r Standard Production Calendar

as of 1/20/2016

Build 7.0.00 L2 XCO2 Production & Delivery Status - Retrospective Calibration

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
July																																	
August																																	
September						D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
October	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
November	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
December	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
January-15	D	D	D	D	D																												
February	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
March	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
April	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
May																																	
June	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
July	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
August	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
September	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
October																																	
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December																																	
January																																	

 Warm
  Cold, unstable
  Cold, stable
  Completely without Science

B7 processing  
 complete
  incomplete
  not begun

B7r processing  
 complete
  incomplete
  not begun

Facility  
 cluster
  Pleiades
  Amazon
 Days delivered to GES DISC  
 all orbits delivered



# OCO-2 B7r Lite Production Calendar

as of 1/20/2016

Build 7.0.00 Lite XCO2 Production & Delivery Status - Retrospective Calibration

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
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November	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
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  Pleiades     
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**Days delivered to GES DISC**  
 all orbits delivered

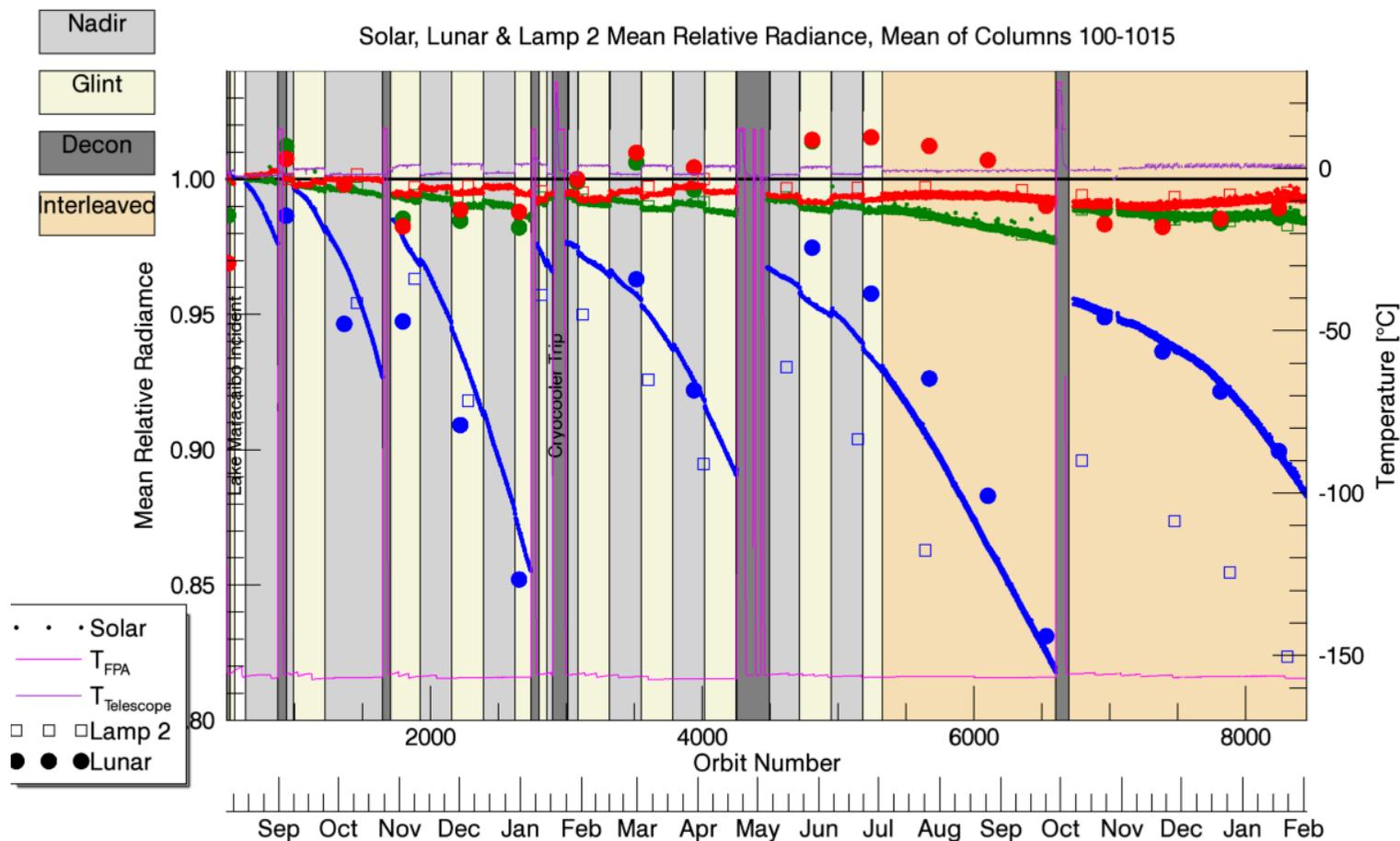


# Instrument Status

# OCO-2 Instrument Status

- **The instrument operations are nominal**
  - Currently investigating possible changes in the ILS
- **A-Band Sensitivity Variations**
  - The sensitivity degradation has two separate components
    - A “fast degradation” that is reversed by decontamination cycles
    - A “slow degradation” that is monotonic
  - Both fast and slow degradation are corrected in the L1b product
  - A plausible root cause for the “fast” sensitivity degradation has been identified -- ice on the focal plane and cold filter degrades efficiency of the anti-reflection coating
  - The root cause for the slow degradation is still uncertain, but there is increasing evidence (Vicarious and Lunar Calibration) that this might be due to degradation of the solar diffuser
  - A “final report” has been issued by the ABO2 tiger team
- **Next decontamination cycle is scheduled for early March 2016**

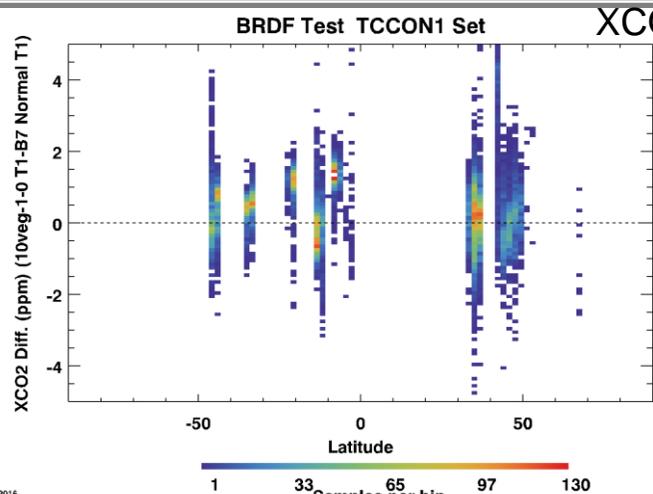
# A-Band Sensitivity Degradation



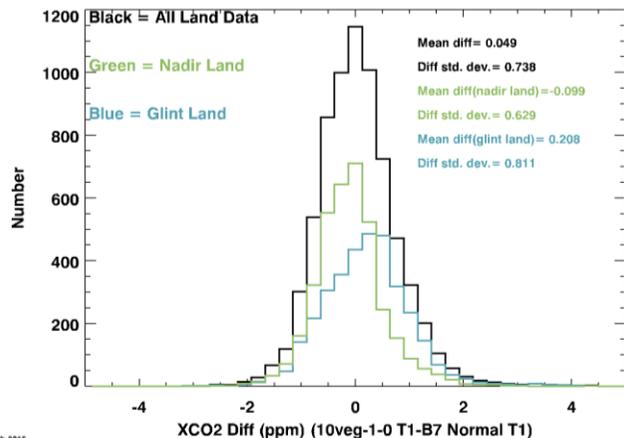
The rate of sensitivity loss in the ABO2 channel (blue) is decreasing with time, for both the “fast” (correctable) and “slow” (monotonic) components of the loss.

# **Version 8 Testing Status and Plans**

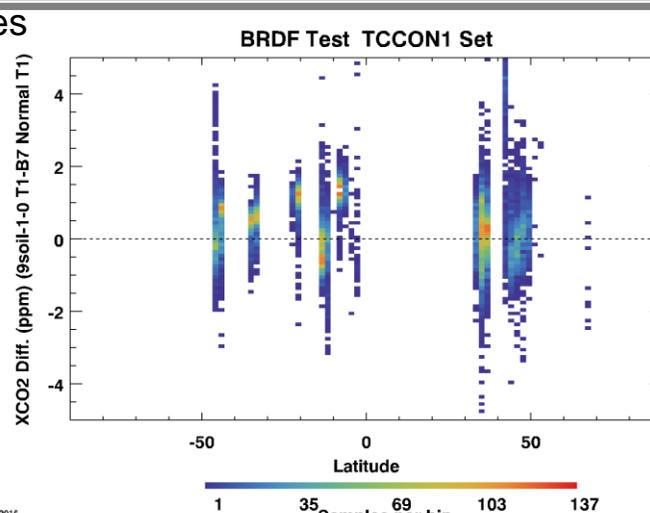
# Non-Lambertian BRDF Tests



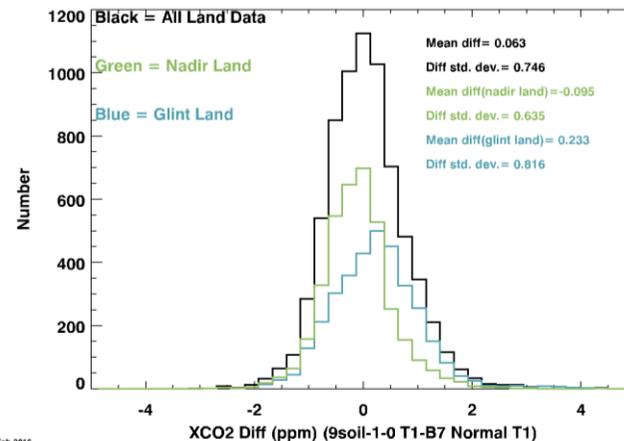
26 Jan 2016



1 Feb 2016



26 Jan 2016



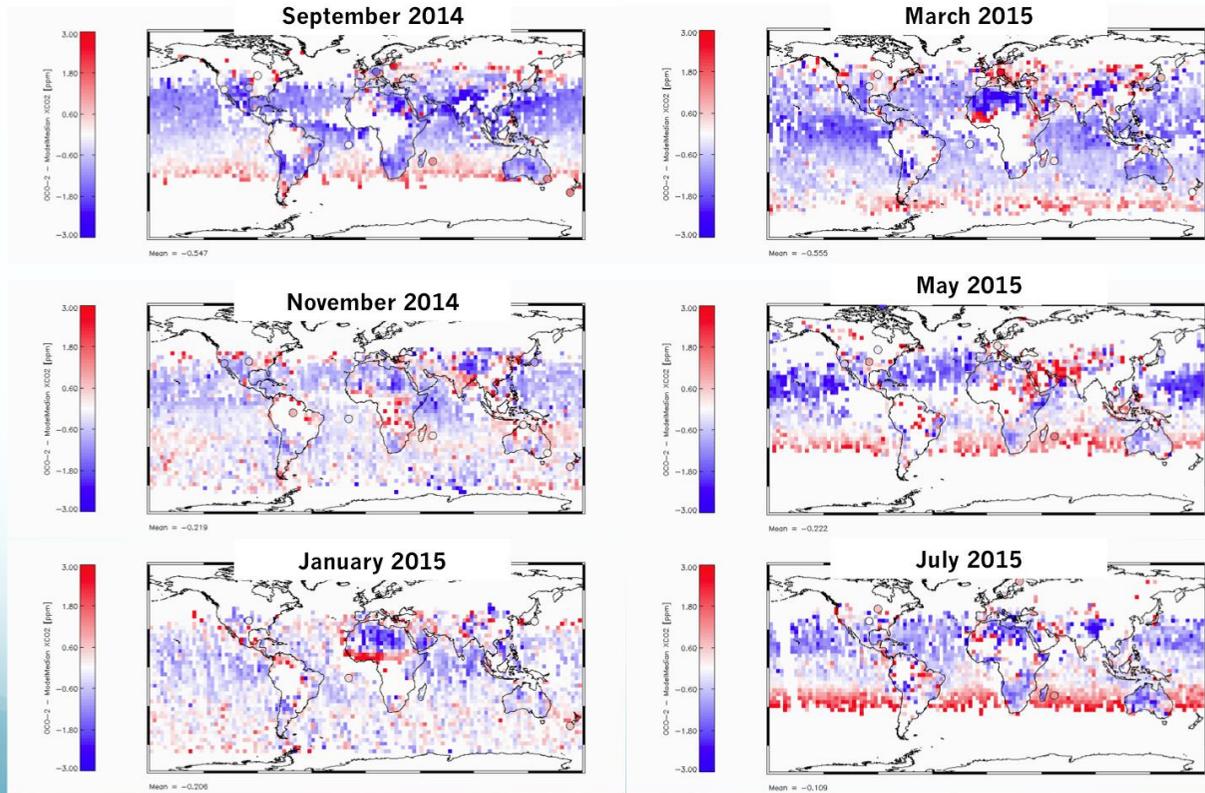
1 Feb 2016

$X_{CO_2}$  estimates appear to be relatively insensitive to the details of the bidirectional reflection distribution (BRDF) model used.

*Natraj et al.*

# The Problem: High Latitude Glint Anomaly

OCO2 - ModelMedian [ppm]



- Glint data looks incorrect at high latitudes for part of year
- Will have smaller focus group meeting daily over next two weeks to try to find a solution

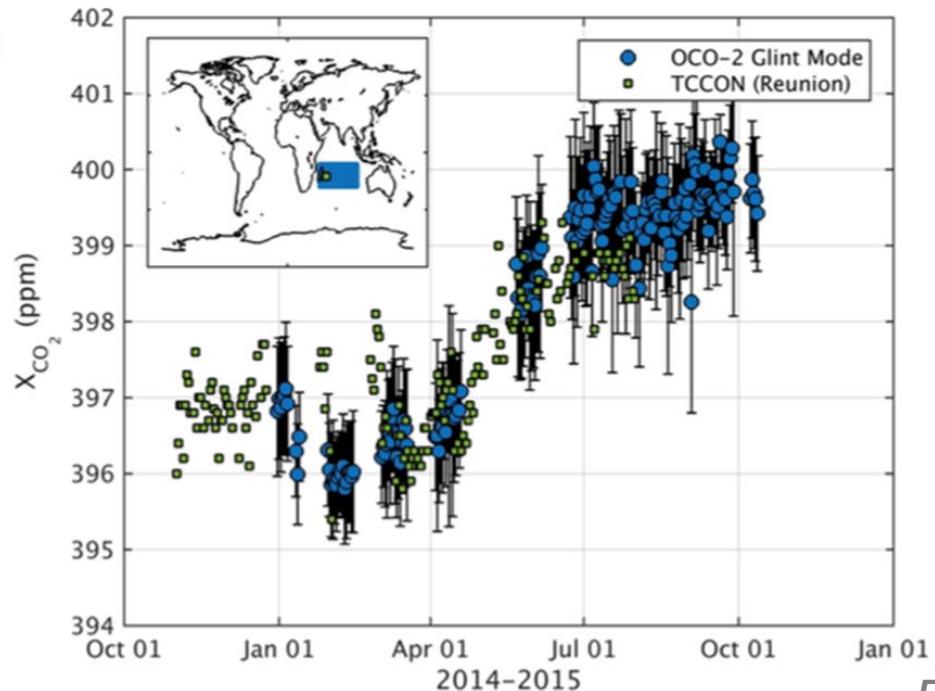
This apparent bias is a major focus of the b8 testing.

*O'Dell et al.*

# At Some locations, the fits to TCCON are fine

## OCO-2 Glint Data vs Reunion TCCON Data

- Pretty nice agreement with the Reunion TCCON data; little apparent deviation after May, 2015

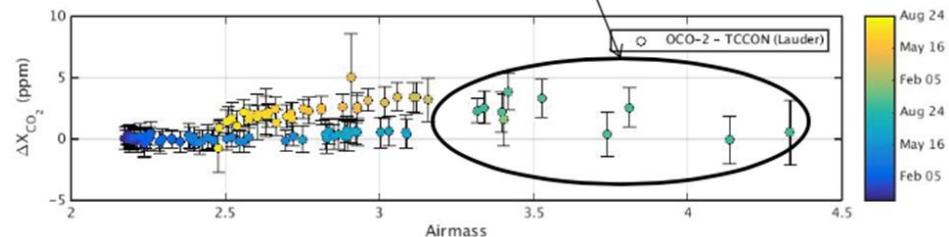
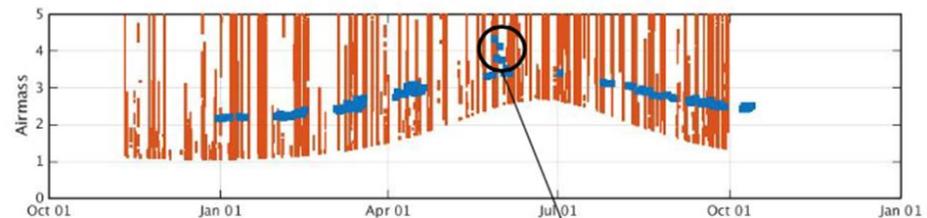
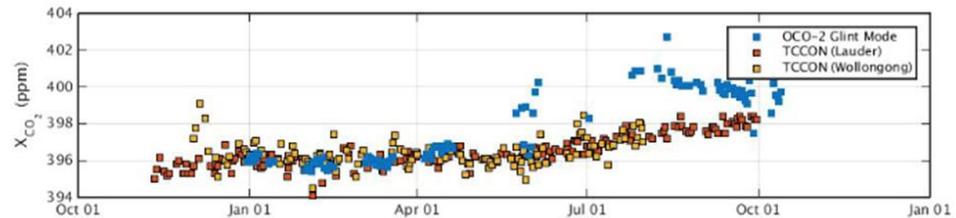


*D. Wunch*

# At others, they are quite poor

## OCO-2 Ocean Glint Data – Lauder TCCON Data vs Airmass

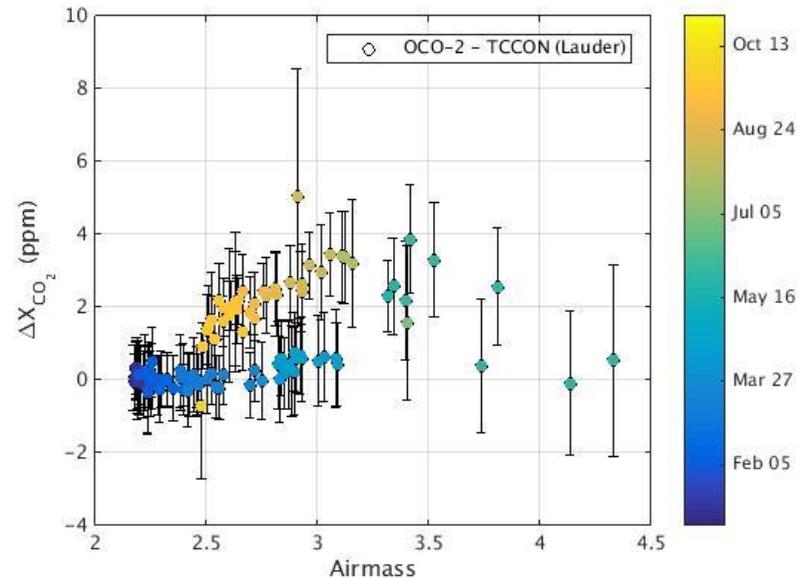
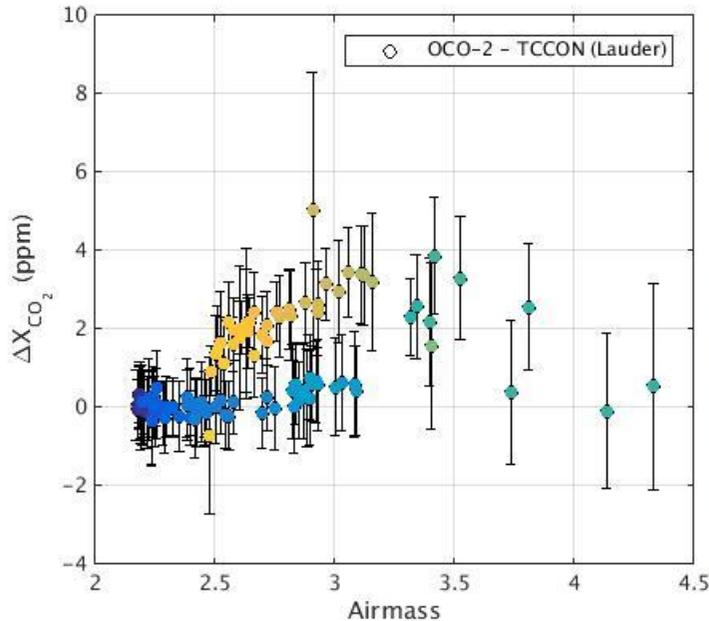
- Not simply an airmass dependence; it looks like the latest data (Oct) is trending back toward the TCCON data.
- Airmass peaks in June, but largest deviations appear in ~August.
- Data that deviates from the Lauder record “looks” more like the lower latitude (e.g., Reunion) data in magnitude (probably coincidental).



*D. Wunch*

# The errors are not strictly a function of airmass or scattering angle

- Error not consistent in airmass or scattering angle



This task is ongoing – stay tuned for progress!

# **GOSAT v201201 Processing Plans**

# Plans for Processing the GOSAT v201201 Product

- There is a strong consensus among the OCO-2 Science Team that a uniform, 6+year GOSAT product processed through the same algorithm as the OCO-2 product would be valuable for several investigations.
- The OCO-2 Science Data Operations System (SDOS) team is preparing to reprocess the v201 product
  - Updated documentation on the differences between this product and the v160160 product has been obtained
  - Some questions remain to be answered.
- Substantial progress has been made in understanding the differences between the v161.161 and v201.201 product
- Timing of the reprocessing effort is under discussion, and will be modified pending the outcome of the tests

# Theme Group Meeting/Telecon Schedules

- Absorption Coefficient, Alternate Mondays, 11 AM PST
- Calibration: Wednesdays, 11-12 AM
- Cloud/Aerosol: ????
- Flux Inversion: Alternate Tuesdays, 1-2 PM PST
- Level 2 Algorithm: Monday and Wednesday at 10 AM PST
- Uncertainty Quantification: Alternate Wednesdays, noon to 1 PM PST
- Validation: Alternate Mondays, noon PST

# Upcoming Meetings

- **21-23 March 2016: OCO-2 Science Team Meeting, Caltech**
- **17-22 April 2016: EGU, Vienna**
- **17-22 April 2016: International Radiation Symposium, Auckland, New Zealand**
- **9-13 May 2016: ESA Living Planet Symposium, Prague**
- **17-18 May 2016: NOAA ESRL GMD Annual Meeting, Boulder**
- **22-26 May 2016: Japan Geosciences Union (JpGU), Makuhari Messe, Japan**
- **6-7.5 June, 2016: GOSAT RA PI Meeting, Kyoto**
- **7.5-9 June, 2016: IWGGMS-12, Kyoto**
- **10 June, 2016 OCO-2/GOSAT TIM, Nara**