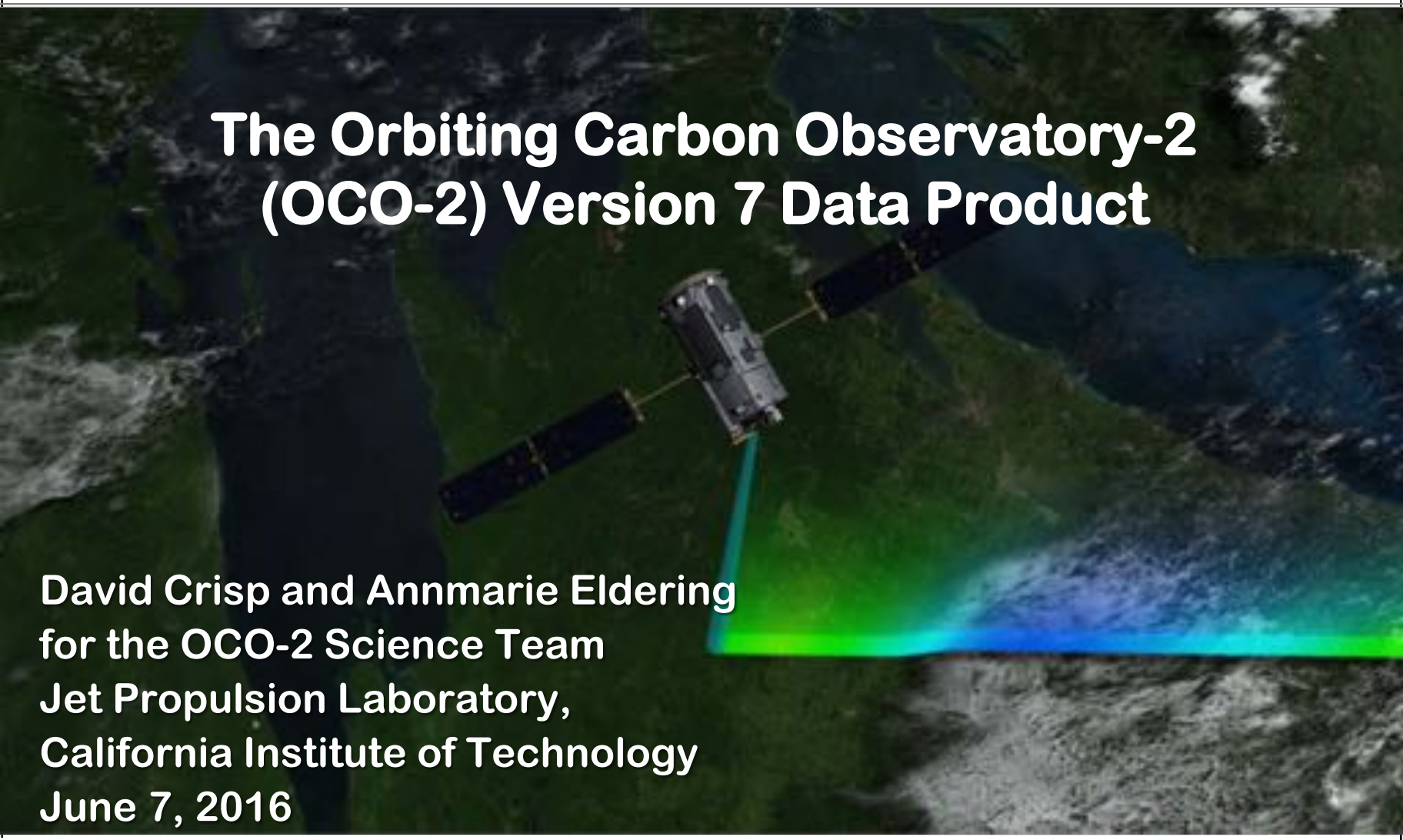
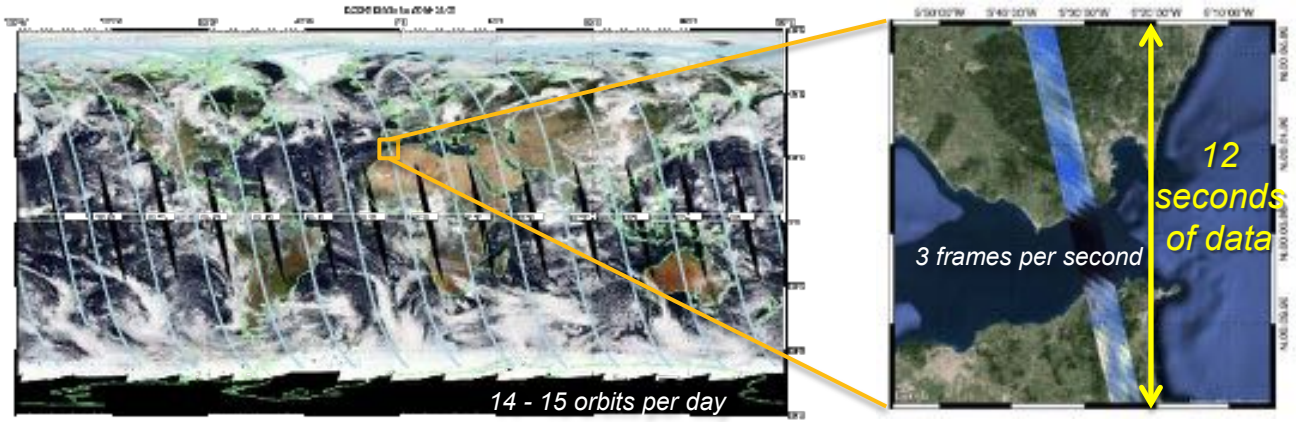
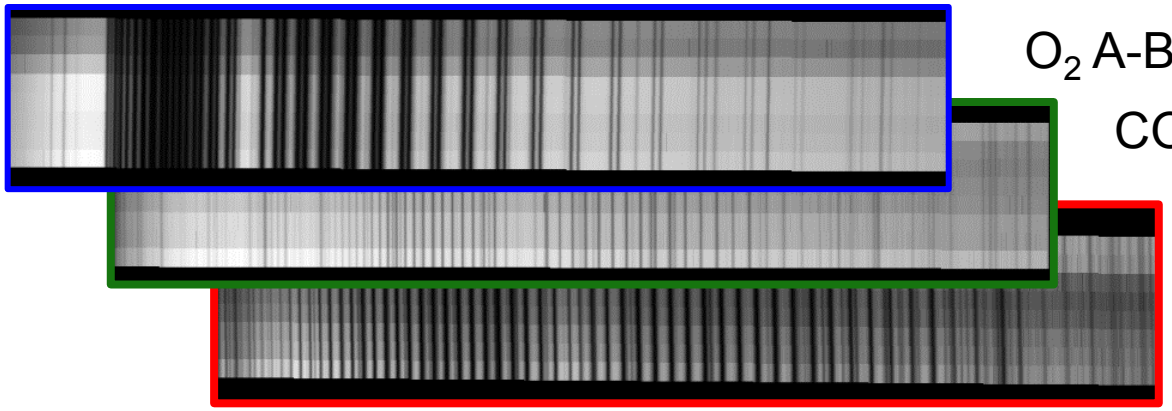


The Orbiting Carbon Observatory-2 (OCO-2) Version 7 Data Product

David Crisp and Annmarie Eldering
for the OCO-2 Science Team
Jet Propulsion Laboratory,
California Institute of Technology
June 7, 2016

OCO-2 Sampling Approach





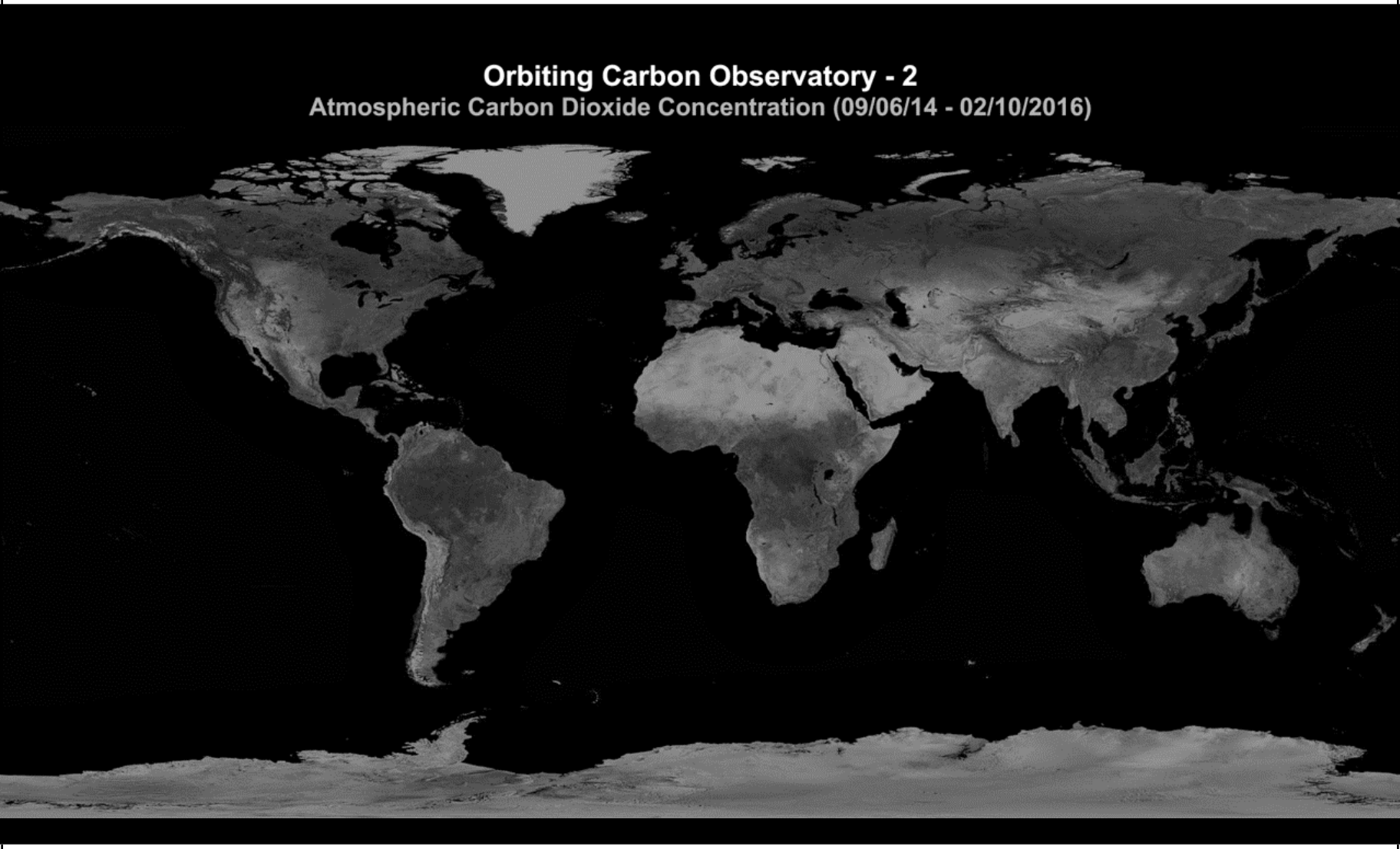
O_2 A-Band

CO_2 1.61 μm Band

CO_2 2.06 μm Band

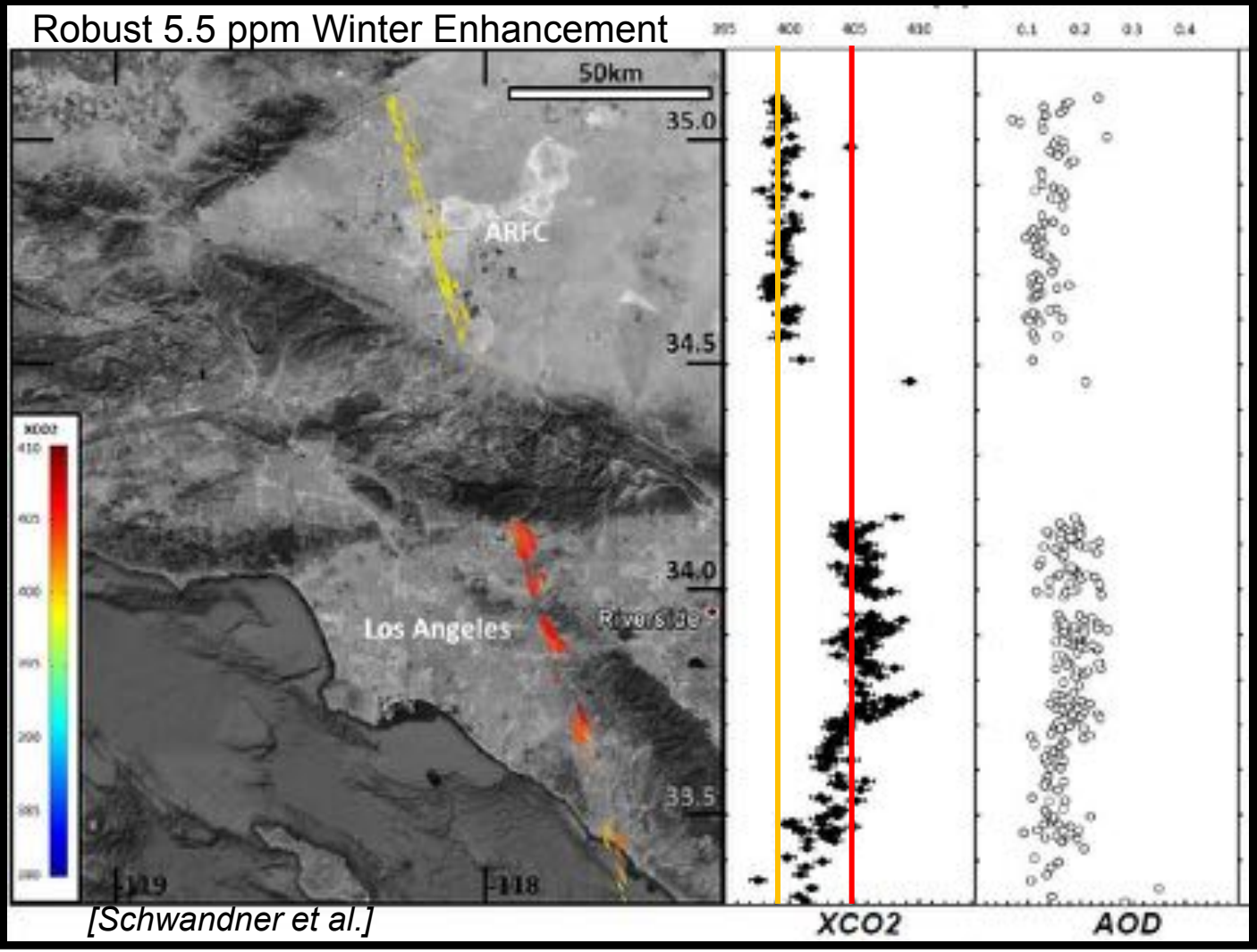
The OCO-2 instrument collects 24 soundings each second as it flies over the sunlit hemisphere of the Earth, yielding almost 1 million soundings each day

A Quick Look at the First 17 Months of Operations



Small-Scale Emission Structures

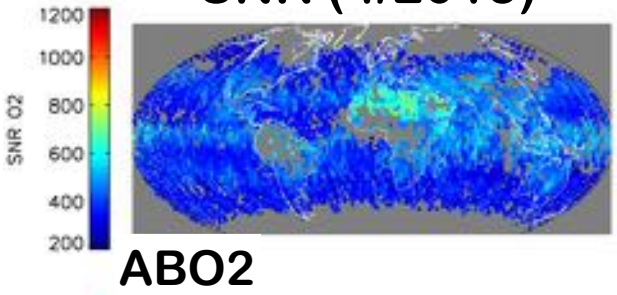
2015/01/13 Glint orbit 2848 over Los Angeles and Antelope Valley



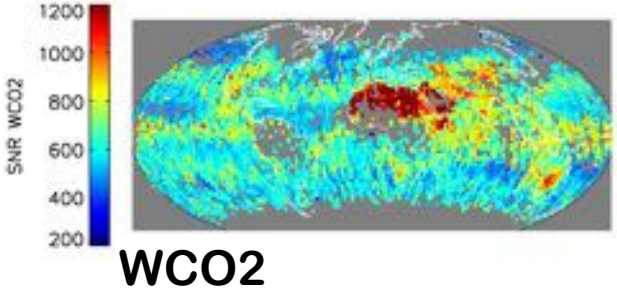
[Schwandner et al.]

SNR and Single Sounding Random Error

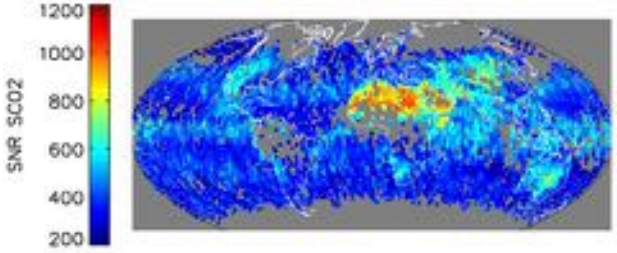
SNR (4/2015)



ABO2

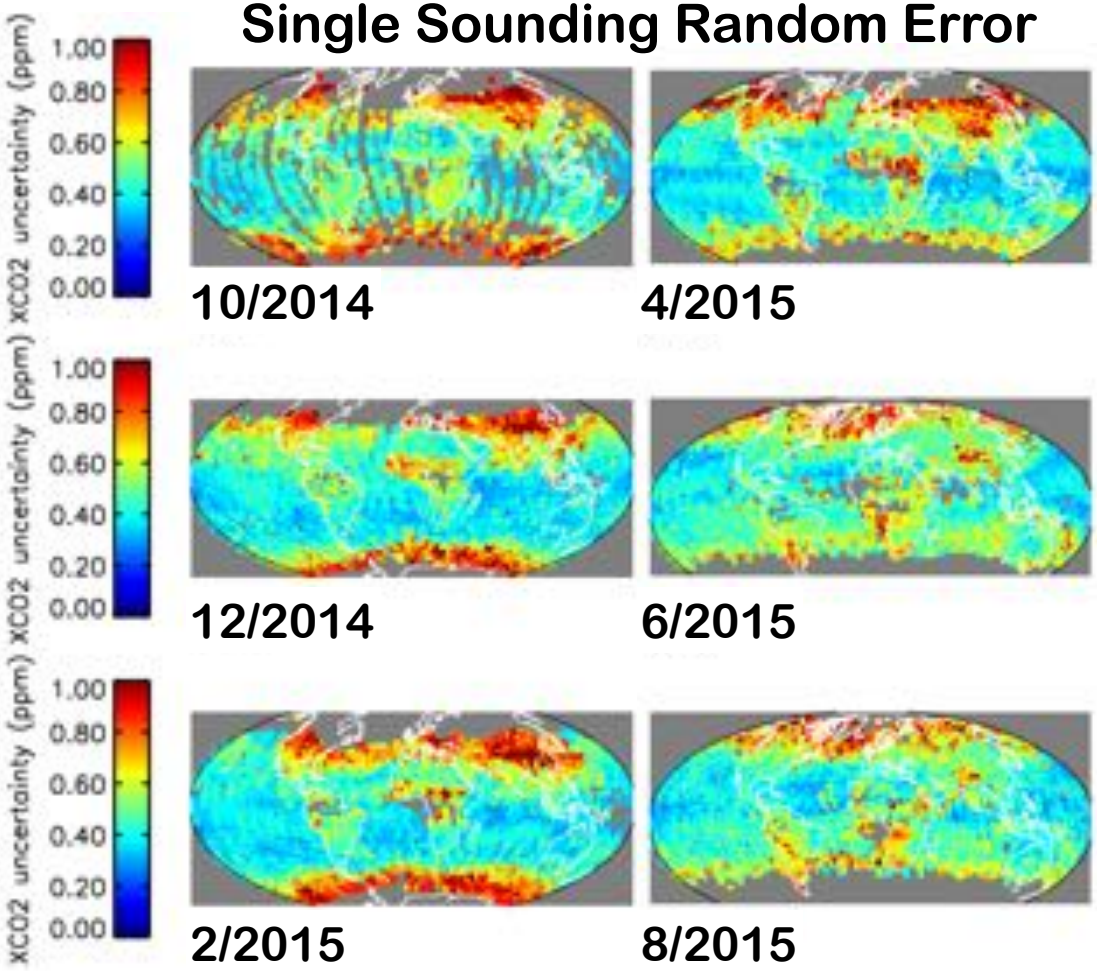


WCO2



SCO2

Single Sounding Random Error



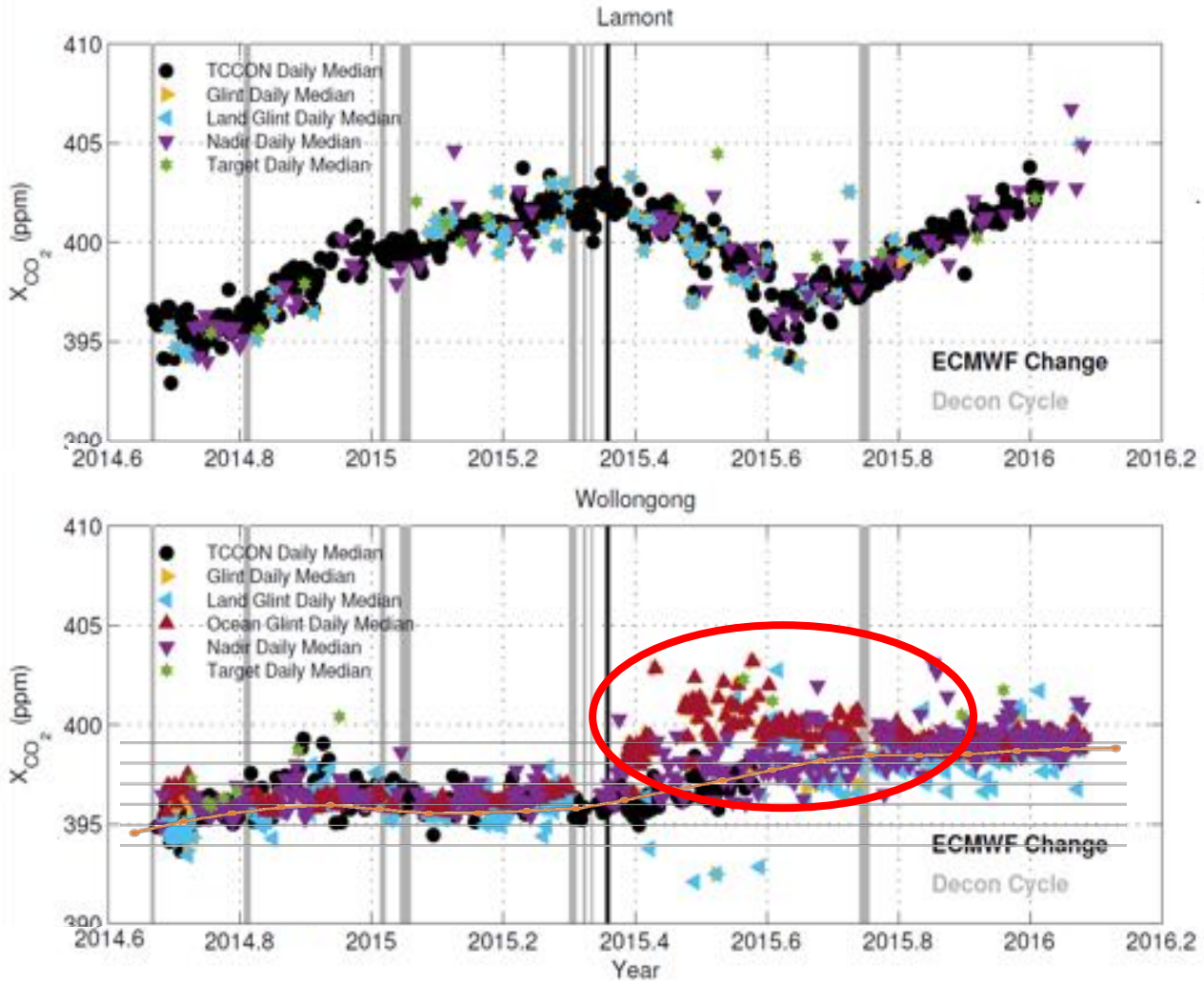
10/2014 4/2015

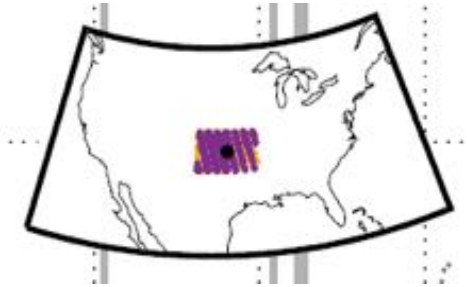
12/2014 6/2015

2/2015 8/2015

High SNR → Low Random X_{CO2} Error

Temporal Changes in X_{CO2}: Comparisons with TCCON and other Standards

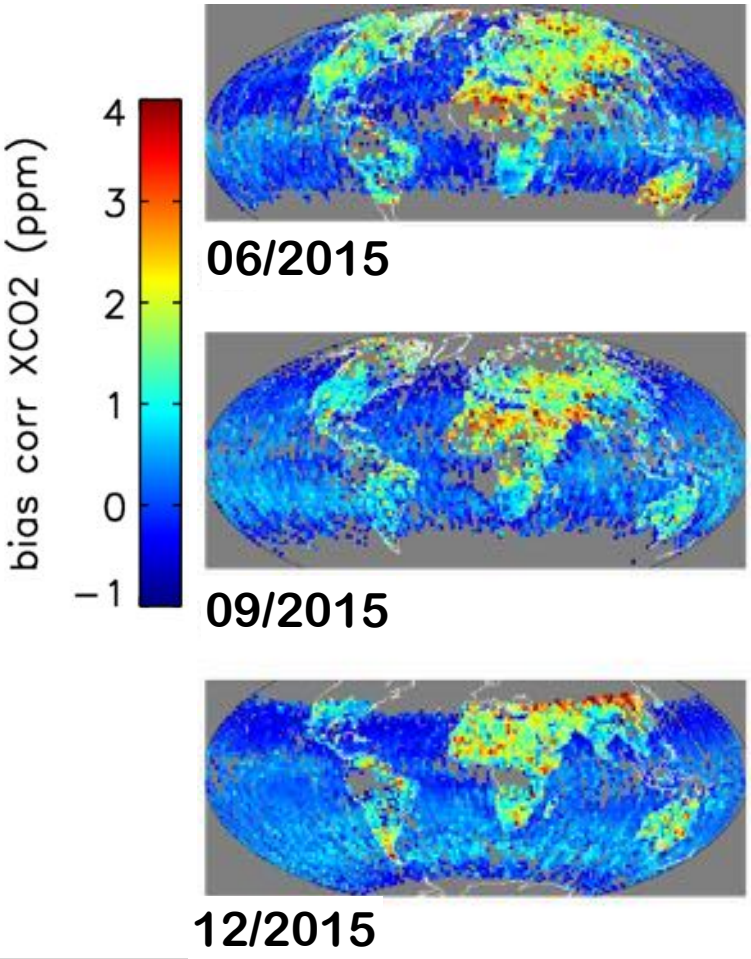




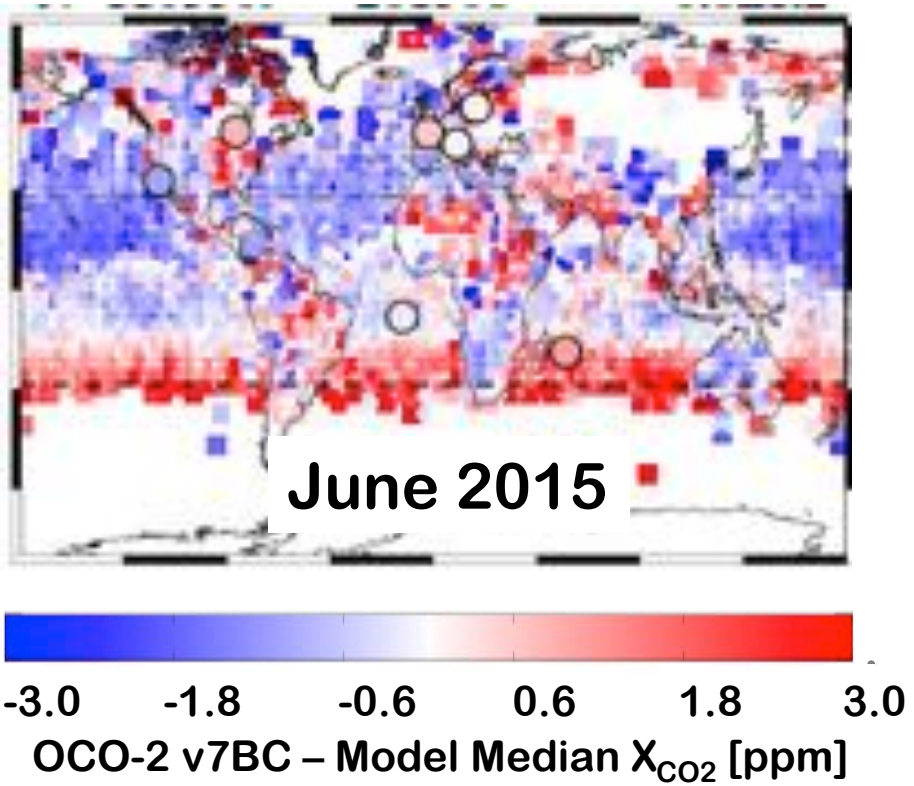
CSIRO Marine and Atmospheric Research and Australian Bureau of Meteorology (Cape Grim Baseline Air Pollution Station)

Bias Corrections in the V7 Lite Products

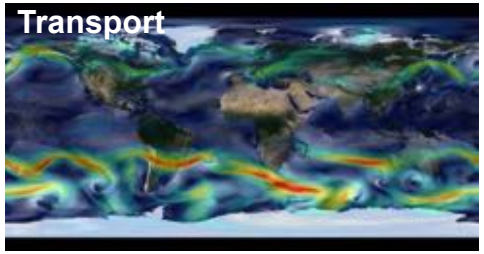
Amplitude of V7 Lite bias correction in 2°x2° bins



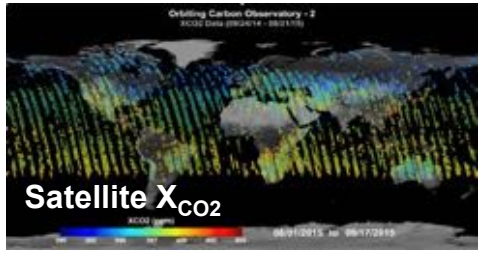
Residual bias vs Multi-Model Means



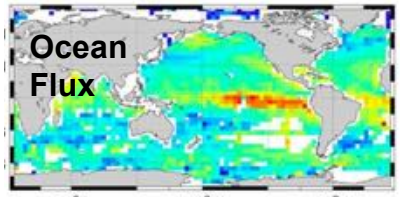
“Top-Down” Flux Inversion Estimates

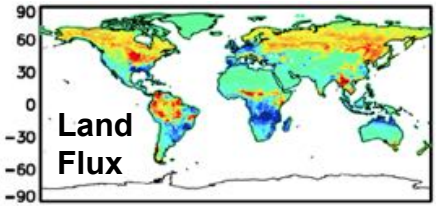


In situ CO_2



Prior Fluxes

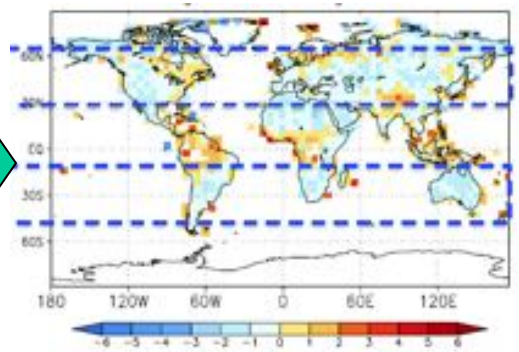




Flux Inversion Model

$$\frac{\partial C}{\partial t} = E - kC$$

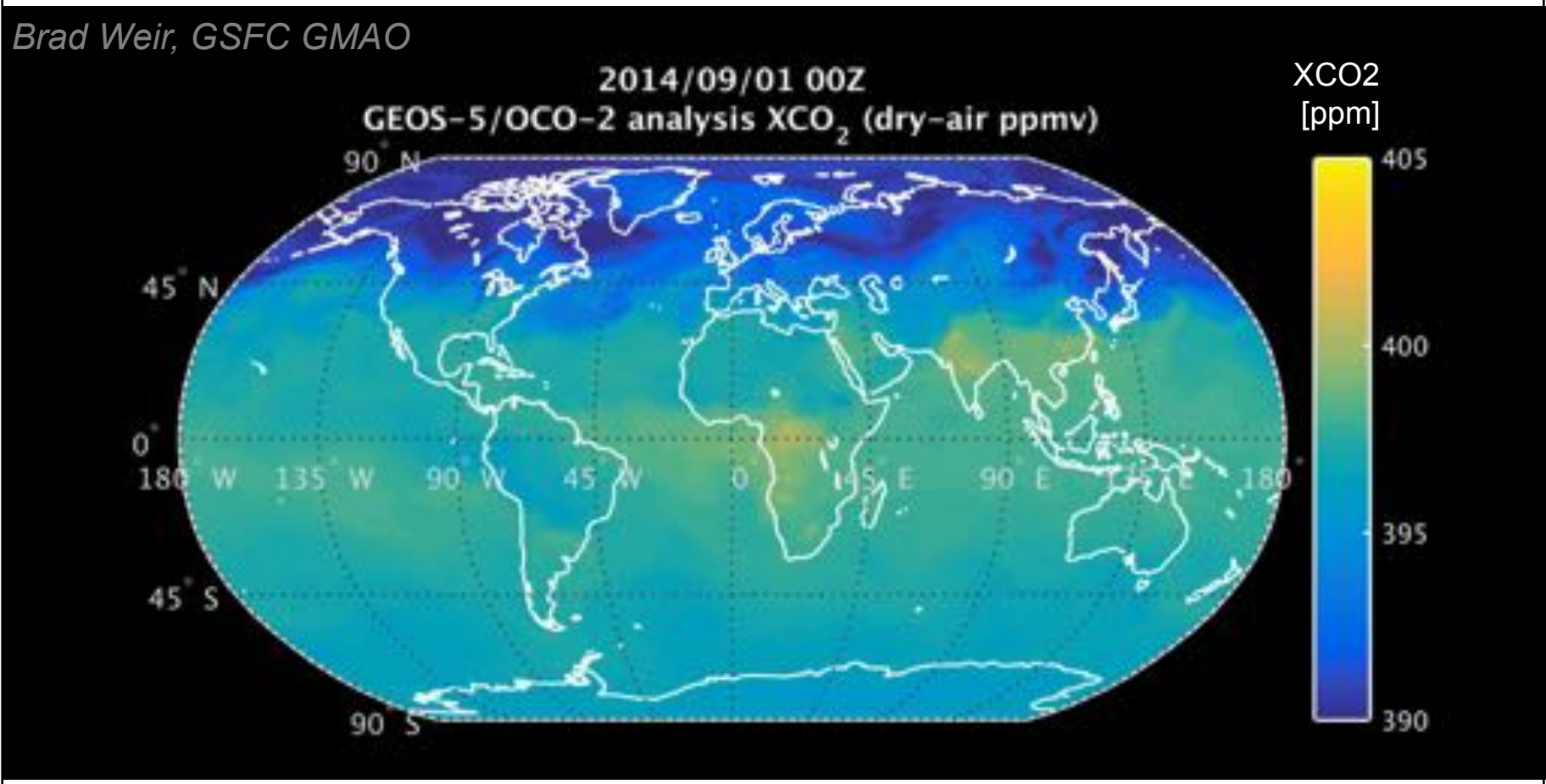
Optimizer



Optimized Fluxes

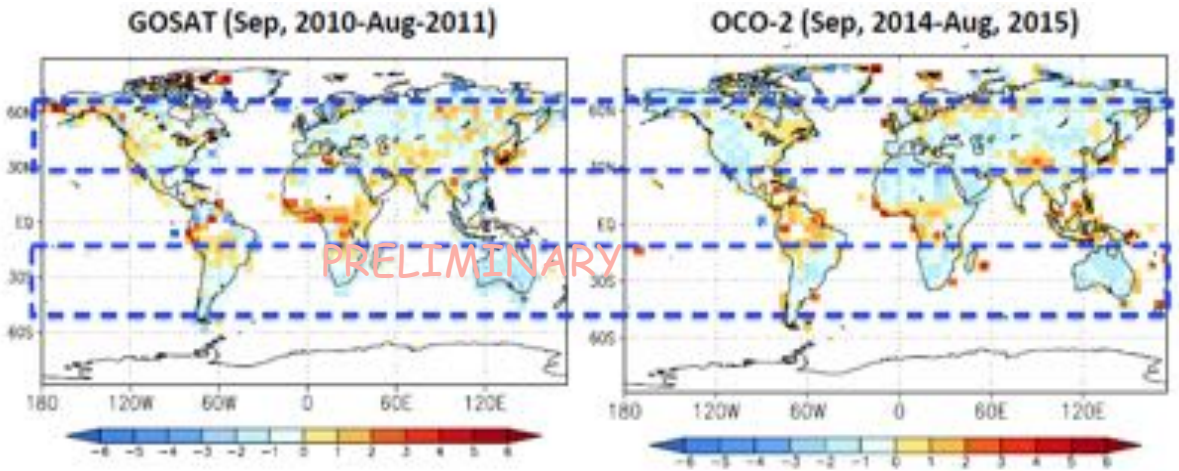
OCO-2 X_{CO2} Assimilated into GEOS-5

Brad Weir, GSFC GMAO

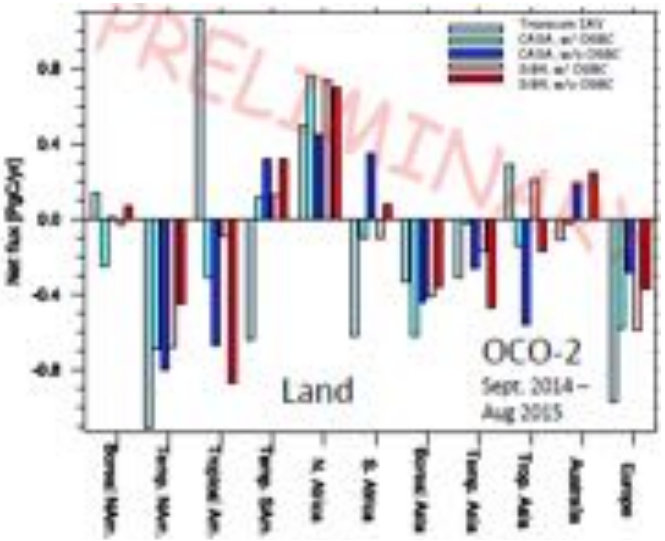


See also: Poster 11: Brad Weir, et al., Accounting for systematic differences between OCO-2 retrievals and model values of XCO2 in an assimilation system

Preliminary CO_2 Flux Inversion Results



GOSAT & OCO-2 inversions indicate larger sources in tropics and larger sinks at higher latitudes [J. Liu et al.]



CO_2 flux amplitude depends on bias correction applied to OCO-2 data [D. Baker]

Summary

- OCO-2 was successfully launched on 2 July 2014, and began routine operations on 6 September 2014
  - Now returning about 100,000 full-column measurements of X_{CO2} each day over the sunlit hemisphere
  - These products are being validated against TCCON and other standards to assess their accuracy
- Over 18 months of data has been delivered to the Goddard Earth Sciences Data and Information Services Center (GES-DISC) for distribution to the science community
  - September 6 2014 – 4 May 2016 delivered

http://disc.sci.gsfc.nasa.gov/OCO-2

- This product is now being used by the carbon cycle science community to identify and quantify the CO_2 sources and sinks on regional scales over the globe

Thank You for Your Attention

Questions?