MEETING AGENDA
Aura Validation Working Group (AVWG)
Aura Science Team Meeting, Columbia, MD, USA
Monday, October 27, 9 a.m.

		[mins.] / time
Introduction	(Lucien Froidevaux / Anne Douglass)	[5] **9 a.m.**
MLS Validation Update/Issues	(Lucien Froidevaux)	[15]
HIRDLS Validation Update/Issues	(Bruno Nardi)	[15]
TES Validation Update/Issues	(Greg Osterman)	[15]
OMI Validation Update/Issues	(Mark Kroon)	[15]
Validation of ozone profile retrievals from OMI [summary]	(Xiong Liu)	[5]
Ozone profiles from OMI & CMAQ simulation [summary]	(Mike Newchurch)	[5]
AquaVIT results/update	(David Fahey)	[15]
SAUNA update	(Rich McPeters)	[10]
********** **BREAK** **********		**[15-20]**
Validation of OMI tropospheric NO_2 [summary]	(Jennifer Hains)	[5]
OMI validation with the ground-based WSU MFDOAS Spectrometer	(G. Mount)	[15]
Native Trailer	(Anne Thompson/Sam Oltmans/Bill Brune)	[20]
AVDC Status/Plans and related discussions		
> Status/Plans	(Christian Retscher)	[15]
[NDACC/AVDC, GECA project, longer-term validation needs]		
> More discussion about inventory and needs for key sites ?	(+ all)	
> Data transfer / availability issues ?	(+ all)	
Other AVWG discussion topics / issues ?	(+ all)	
********** **ADJOURN** **********		**noon**

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Introduction / Comments

The GCOS Reference Upper Air Network

(Information provided by Holger Vömel, Germany)

Motivation:

-Provide high vertical resolution reference data in troposphere and stratosphere for temperature, water vapor (rel. humidity), pressure, winds, and several other parameters.

Targets :

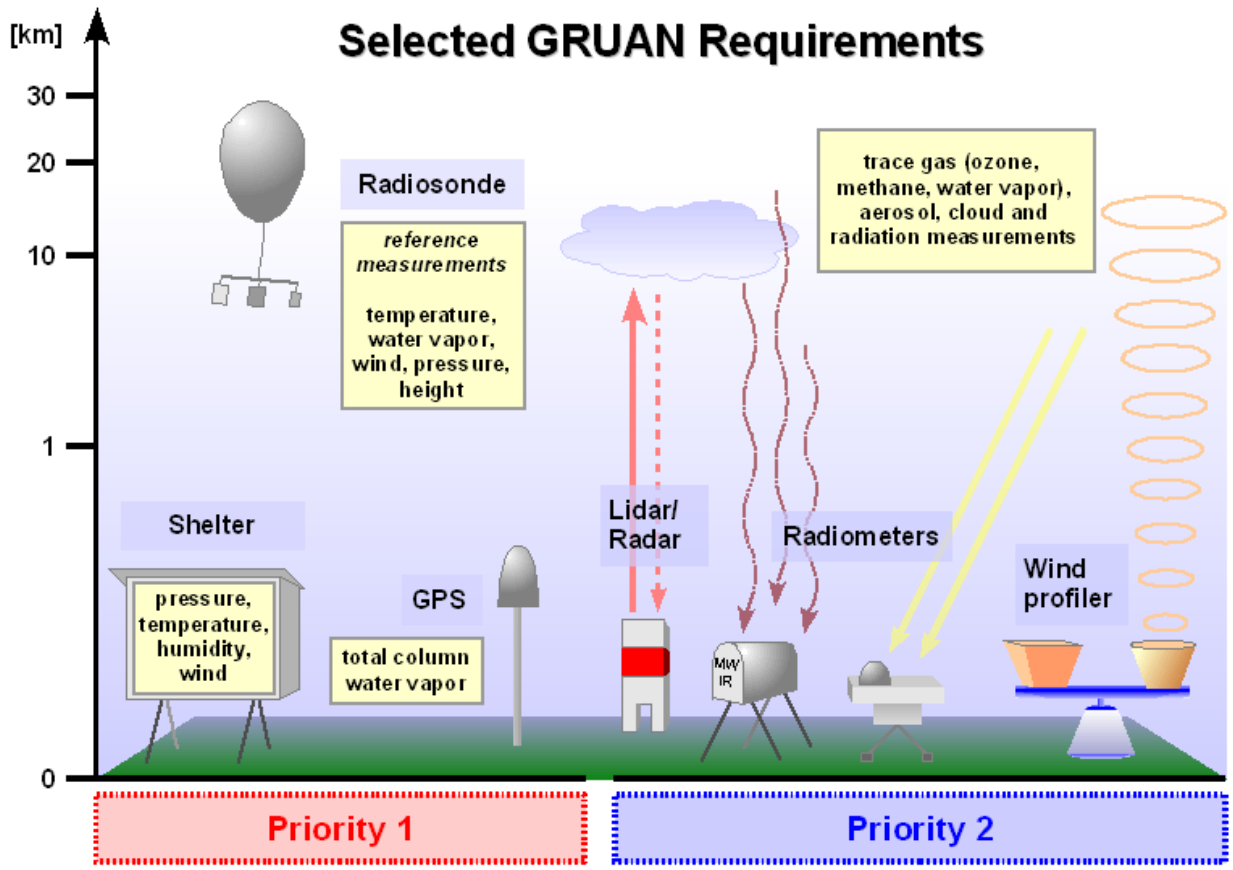
- Long term climate data
- Satellite validation
- Science of atmospheric processes

Beginning network setup and design; within a few months, expect dedicated GRUAN soundings. Met. Observatory of the German Weather Service at Lindenberg is designated lead center.

The GCOS Reference Upper Air Network

Contact Holger Voemel for more information (Holger.Voemel@dwd.de).

Worldwide Network of Reference Stations using:
- **High quality balloon borne instruments**
- **Ground based remote sensing**
- **High quality ground checks for sondes**
- **Analysis of measurement uncertainties**



MLS calibration/validation update

(L. Froidevaux and MLS team, Jet Propulsion Laboratory, Caltech)

- Overview of progress for MLS cal/val issues
  - some important internal activities relate to v3 retrieval software improvements

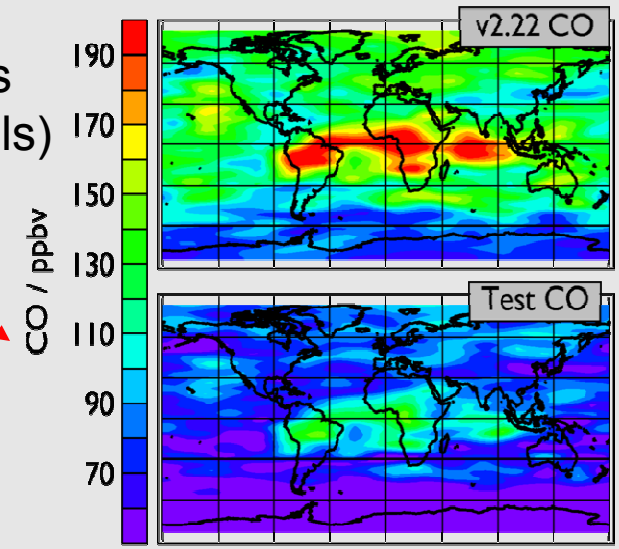
- Additional correlative data needs?
  - additional cloud information would be very useful to help reduce uncertainties (see details in later slide)
  - more balloon data can be useful also
    > adds to database and reduces uncertainties somewhat
    [e.g. for HCl, HOCl at midlatitudes; possibly ClO in polar regions]

- Longer-term validation of interannual changes will be based mostly on continuing comparisons versus other satellite datasets **and** on the NDACC database [this database also useful for pre-Aura to Aura (and post-Aura) cross-calibration].
  - Also, continuing datasets from MOZAIC and SHADOZ will be useful for continued calibration/validation efforts for upper tropospheric and lower stratospheric products.

CO

(N. Livesey, H. Pumphrey)

- CO in upper troposphere
  - Investigation (by W. Read et al.) of UT CO MLS high bias [factor of ~ two at 215 hPa]
    - > looked at various instrumental & spectroscopic issues (no “silver bullet” yet)
    - > radiance simulations using “truth” CO profiles from AVE (MOZAIC data to be added)
    - → find that sloping difference exists in radiances across some 240 GHz bands (providing O_3 & CO retrievals)
    - > empirical radiance correction for such a slope leads to reduced CO in test retrievals (1 day)
    - > may use this type of correction for v3 software (morphology in maps comes from MLS radiances)
    - > work in progress

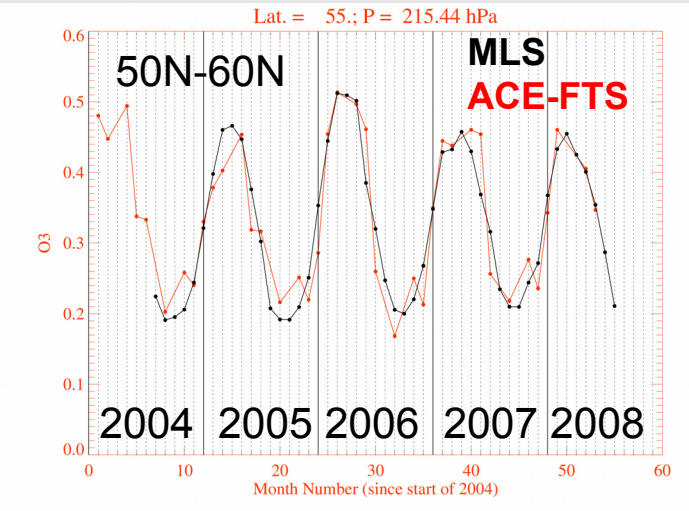


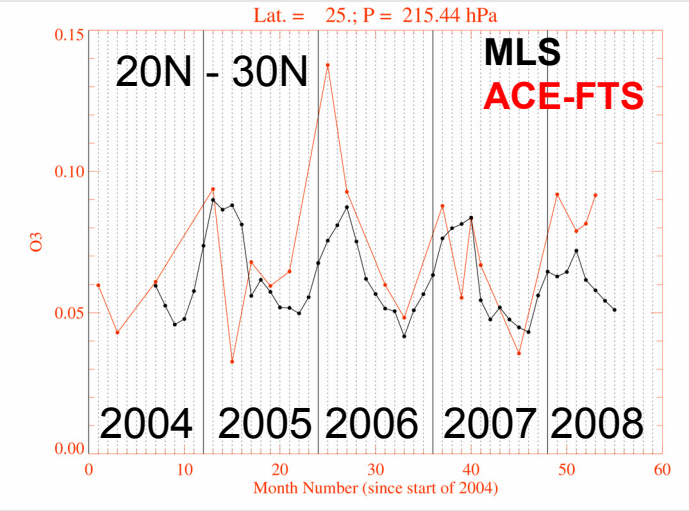
- CO in stratosphere/mesosphere
  - Plan to investigate comparisons of ground-based column CO data versus MLS CO

O_3

(L. Froidevaux, N. Livesey)

- O_3 is a high quality product (with possibly some high biases near 200 hPa)
  - zonal mean comparisons between MLS and ACE-FTS data [see below] do not show obvious systematic biases (or MLS high bias vs ACE-FTS) > although probably need more ACE-FTS validation for these pressures





- v3 retrieval changes for CO (retrieved from same 240 GHz radiometer as O_3)
  → will probably not impact UT/LS O_3 very significantly (but more work needed)

- Also, <u>higher vertical resolution grid</u> (by factor of two) is being investigated for v3

H_2O

(A. Lambert, W. Read)

- H_2O in stratosphere
  - mitigation of 'kink' in profiles at 26/32 hPa
    > by using updated H_2O linewidth and by moving the breakpoint in "fine to coarse" retrieval grid spacing (now at 22 hPa) up to 1 hPa

- H_2O and RHi in UT
  - will be a useful product in V3 at 383 hPa (tropics) / 464 hPa (high lats.)
    > bias reduction versus AIRS achieved via empirical adjustment (by slightly under 1%) to effective antenna transmission for 190 GHz frequency range; such an effect could come from imperfect knowledge of ohmic losses and/or antenna spillover contributions (or from a change after ground calibration or launch).

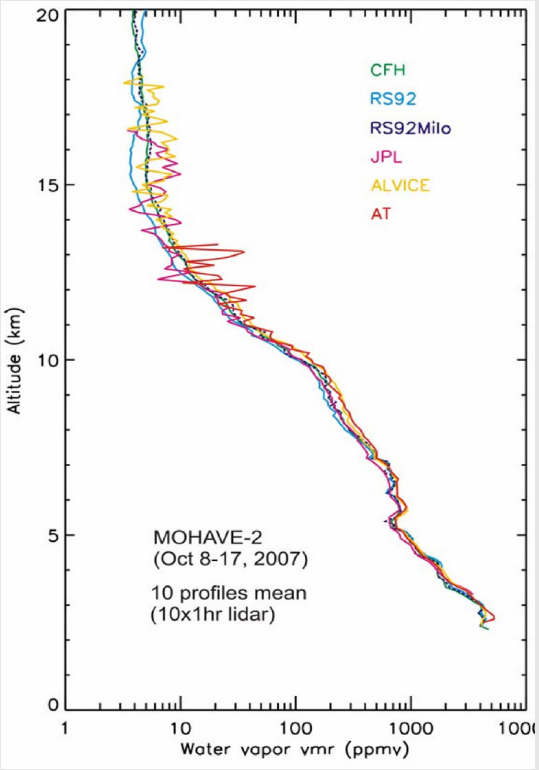
- Interested in progress relating to aircraft/CFH/MLS discrepancies in UT/LS H_2O
  - as this does pertain to MLS validation [+ more discussions at this Aura meeting]

- MOHAVE campaigns (*Leblanc et al.*) are also expected to lead to improvements in H_2O lidar UT/LS data – and should relate to overall H_2O validation
  - lidars have made improvements (on fluorescence issue); more data expected.

H_2O MOHAVE campaign plans

(from T. Leblanc)

- **2009 campaign plans** (assuming funding)
  tentative dates: Oct. 12-26 (2009)
  - 3 or 4 Raman lidars
  [JPL, GSFC (2), maybe Germany mobile lidar]
  - 2 FTIR [JPL, Germany]
  - 2 microwave [NRL, Switzerland]
  - 2 hygrometer sonde sets [CFHs, NOAA FPHs]
  - 2 radiosonde sets
  [Vaisala RS-92, and IMET – future coupling with O_3, CFH]
  - 1 FTUVS [JPL]
  - 2 GPS [GSFC, JPL- SuomiNet]
  > Enhanced support from ozone sondes,
  JPL ozone and T lidars, and high-resolution model runs
  (MIMOSA-UT/LS, including PV forecasts and H2O/cirrus analyses)
  > Tracking of high variability in the UT/LS with lidars



- Additional investigators are welcome, including aircraft (Dryden is close!)

HCl, HOCl

(L. Froidevaux)

- HCl
  - v2.2 abundances are slightly larger than HCl from v1.5 data
  - A trend issue in terms of different bands' retrievals has emerged, after analysis of full v2.2 reprocessing [early days were processed last]
    > Daily continuous band 13 data ceased in mid-Feb 2006
    > "Trends" for 4 yr avgs. using band 14 data in the upper stratosphere are smaller than the initial 1.5 yr of band 13 data; the trend results also show inconsistencies in the radiances between the bands (on same spectral lines), with B14 results yielding a slower trend than results from ACE-FTS (and ground-based and model expectations)
    → instrumental/calibration issues need to be investigated further

  [See poster presentation by *Froidevaux et al.*]
- HOCl
  - v3 software currently leads to a 20-30% increase in retrieved abundances (arises from updates to spectroscopy, but largely O_3-related, as ozone lines impact weak HOCl signal) → should produce improved (good) agreement of MLS upper sratospheric zonal mean HOCl versus balloon HOCl data
  - No time spent (yet) on correcting/fixing negative biases for P > 20 hPa (retrieval improvements needed)

ClO

(M. Santee)

- Amplitude and altitude of the peak in the ClO profile in the upper stratosphere, as well as latitudinal/seasonal variations in LS ClO are well determined by MLS
- But – a substantial negative bias is present in both daytime and nighttime mixing ratios at retrieval levels below (i.e., pressures greater than) 22 hPa

  - Day-Night differences are **not** recommended to correct for this bias when ClO is enhanced inside the polar vortex

  - In studies for which knowledge of lower stratospheric ClO mixing ratios to better than a few tenths of a ppbv is needed, the negative bias must be corrected for by subtracting its estimated value at each level (see ClO validation paper)

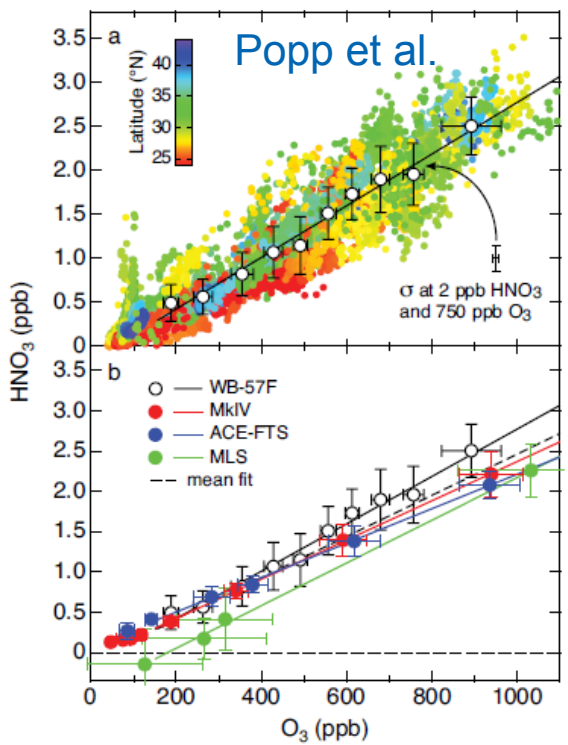
- Preliminary results from Version 3 data processing algorithms now under development indicate that <u>retrieval of CH_3Cl significantly reduces the ClO bias</u>

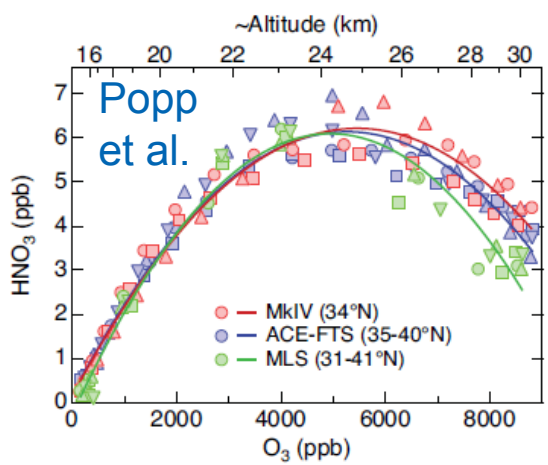
- The CH_3Cl data from the v3 retrievals also look very promising; this data will also need to be validated (using existing ACE-FTS and balloon-borne datasets)

HNO_3

(M. Santee)

- HNO_3/O_3 correlations used to compare MLS data to in situ (WB-57 CIMS) and remote (MkIV, ACE-FTS) measurements *[Popp et al., JGR, submitted, 2008]*
  - Good agreement found in the HNO_3/O_3 correlations from all instruments
  - Known 0.5-1.0 ppbv low bias in MLS HNO_3 confirmed
  - Correlation-based proxy HNO_3 used to extend vertical range of comparisons





- Comparisons between MLS and HIRDLS have also been published *[Kinnison et al., JGR, 2008]*

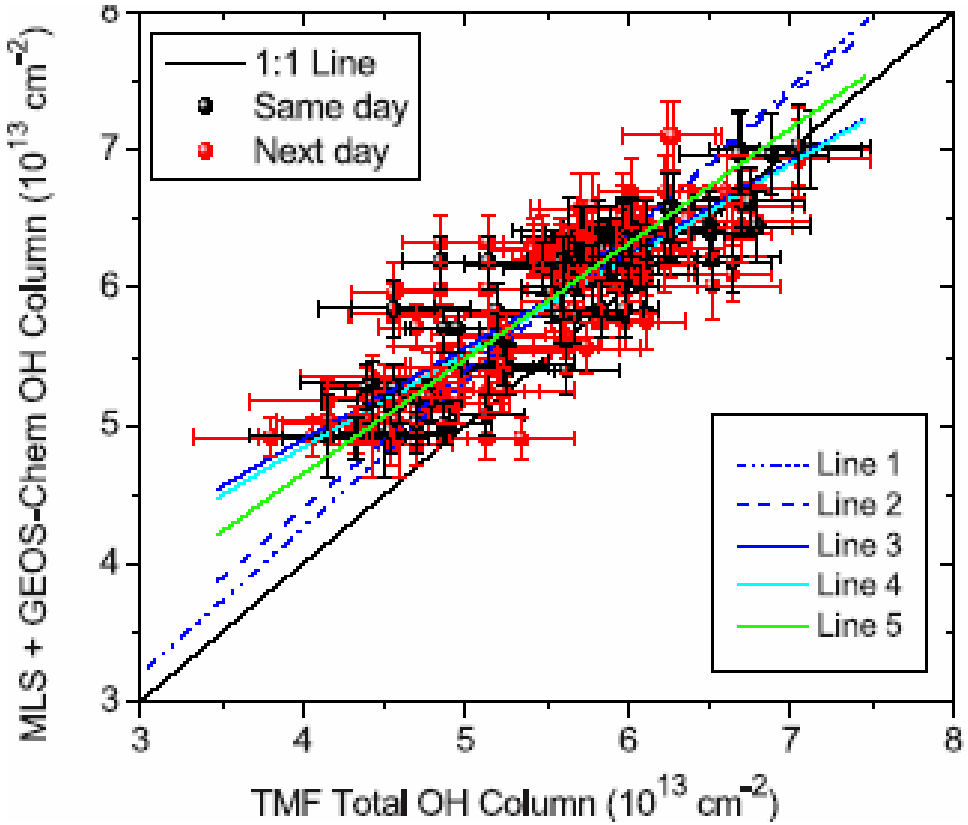
- Mean differences with ACE-FTS HNO_3 found to be generally within ± 1 ppbv from 18 to 35 km *[Wolff et al., ACP, 2008]*, in overall agreement with MLS validation paper

OH

(H. Pickett)

- Comparisons have been made between ground-based measurements of OH column abundances from JPL's FTUVS and the MLS OH columns (2004-2007)
  - using GEOS-Chem and Harvard 2-D model estimates for OH column below 22 hPa
  → excellent agreement
  (and within mutual uncertainties)

- This supports earlier results [*Pickett et al.*] regarding HO_x validation using balloon-borne measurements

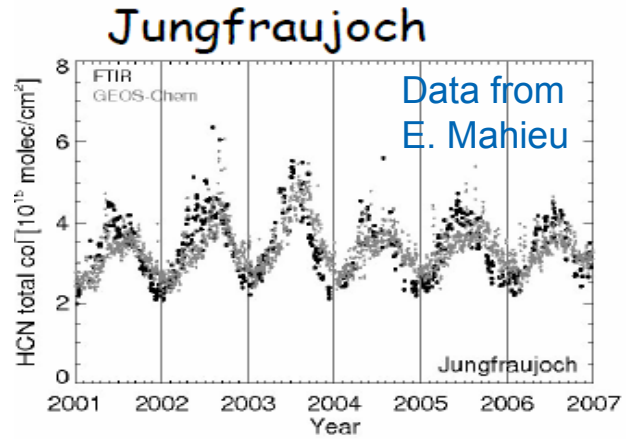


From *Wang et al. [JGR, in press]*

HCN

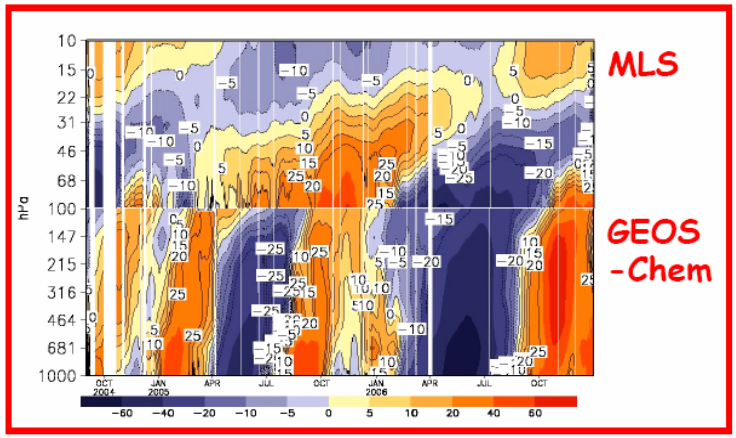
(H. Pumphrey, Q. Li, P. Palmer - UK)

- Investigating column abundance information from ground-based FTIR data (for comparison vs MLS HCN)
- GEOS-Chem simulations (see anomaly plot at bottom right) are being used to interpret the MLS longer-term measurements
- Also plan to make detailed comparisons between MLS HCN (off-line UK binned radiance retrieval product) and ACE-FTS HCN retrievals



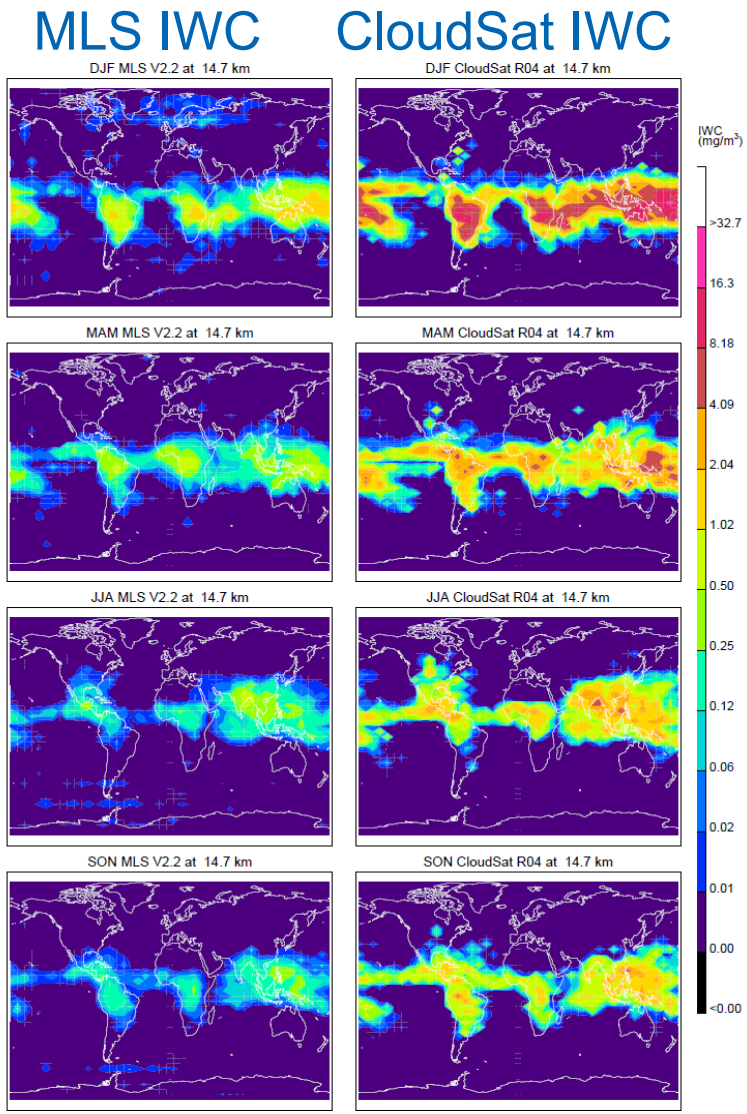
HCN total column data+ GEOS-Chem simulation

Match between MLS and GEOS-Chem



HCN tropical anomalies

Clouds and Ice Water Content (IWC)

(D. Wu, J. Jiang)

- MLS sensitivity to clouds for z > 14 km is better than CloudSat (vice versa for z < 12 km). For z > 14 km, CloudSat IWC values are larger than MLS, ECMWF, and GEOS-5 estimates.
  - IWC morphologies in various seasons agree quite well.
- Improvements in understanding of cloud product (IWC) accuracy and its validation will depend, in large part, on further characterization of cloud particle properties (size distribution in particular)
- More in situ cloud data for this high altitude (cloud anvil) region, e.g. from follow-on to TC^4 campaign, is desirable, even if not collocated with MLS [statistical database information]
- MLS team is also developing a research algorithm to simultaneously retrieve D_{eff} and IWC using 240 GHz and 640 GHz data