

DISCOVER-AQ Team Telecon

March 22, 2012

These notes are referenced to the appended presentation slides and kmz shown during the telecon.

Slide 1 - Data Tasks

- Diskin – Updated calibration of DLH is complete, should have reprocessed data archived by the end of the month
- Chen – An intermediate P-3B merge has been completed for the CO update, but another merge is forthcoming when updated DLH data is archived
- Weinhiemer/Cohen – Ron and Andy are working on the detailed comparison of NO₂ observations, Ron has provided Andy with some material for discussion
- Chen – correction of NO₂ description in file header information for Aldino and Beltsville ground sites will be completed ASAP
- Hains/Joseph – Comparison of HU and MDE ozone shows that the few noisy periods in MDE ozone are not corroborated by HU observations. A comment needs to be added to the MDE file header noting those time periods
- Chen/Long surf O₃ – Final correction of MDE surface ozone data still needs to be completed. Gao Chen to work on this with Russell Long.
- Cede/Herman – While there is still interest in deriving some useful information for CH₂O from last summer's Pandora observations, this possibility cannot be assessed until substantial CH₂O abundances return next summer.
- Hains/Chen (PAMS hydrocarbon) – Jennifer has provided this data. Gao will need to format the data for archival.
- Fuentes/Joseph (surf & balloon obs) – Not on the teleconference, but we will contact them for status on archival of data.
- Thompson (VOC obs) – Analysis is being completed in collaboration with Environment Canada. Once uncertainty estimates are complete, data can be uploaded to the archive.
- Stehr (UMD VOC) – Data not yet available, but forthcoming
- Chen (integrated comparison) – Gao still needs all of the updated data before this task can begin.

Slide 2 – Archival of Raw Data and Documentation Files

- Gao Chen reiterated the procedure for uploading raw data and associated documentation to the Langley ASDC.
- It is recommended to upload a zip file containing all relevant material. This includes all raw data files, algorithms, and other data needed to reprocess the data if necessary.
- Please send Gao the uploaded file name so that he can cross check with ASDC to make sure it is there.

Slides 3&4 – Preliminary Key Findings

- These items shown at AQRS (Air Quality Research Subcommittee) on March 15, 2012
- Please contact Jim and Ken if you would like to suggest items to add to this list.
- Next month Jim will also brief at SMD (Science Mission Directorate)

Slide 5 – Outreach Opportunity

- We will have an AERONET and possibly a Pandora, some clips on the hyper wall, and are thinking about displaying the flight paths from MD deployment on Google earth so kids can see how close we came to their neighborhood.
- The event will be indoors which will preclude active measurements by the Aeronet and Pandora. There was some discussion of finding a place outdoors for the instruments, but there would still be horizon limitations.
- We are looking for any GSFC or UMD volunteers to help staff this event.
- Jeff Stehr will already be there with the UMD booth which is close proximity to the NASA booth. He will look into help from a few students.

Penn State Slides

Slide 1 – Special Issue

- The planned special issue for the Journal of Atmospheric Chemistry will focus on ground observations at Beltsville and Edgewood.
- Many papers focus on boundary layer processes
- Email or call Doug Martins with questions
- Might be possible to have a slightly later deadline for folks involved in SEAC4RS/DC3, but do not want to delay it past about December. There are several younger authors who want to get their papers out.
- There will be other more relevant special issues for the broader team (e.g. aerosol observability, trace gas observability, model assessment, etc.)

Slide 2 – Aircraft-to-Surface ozone comparison at Edgewood

- Correlation is quite good except for a few outliers which are the subject for further analysis
- Brad Pierce would like to see above and below boundary layer analysis, however PSU is focusing on BL processes here
- Ken Pickering is looking at the deeper profiles

Slide 3 – Difference in NATIVE (Edgewood) 8hr ozone compared to broader regional average from the other sites

- Bay Breeze is a dominant influence during periods when Edgewood exceeds the regional average
- This analysis will be updated after correction of the MDE ozone data

DISCOVER-AQ California Discussion – Comments are in reference to discussion of the kmz file used to show the status of current planning

- Already had a good discussion with CARB about potential spiral sites
- Big yellow targets are Jim C's suggestions for spiral locations
- Orange targets are other possible spiral locations
- Green targets are places with additional ground instrumentation
- Clicking on a target reveals a url for detailed information on the site

- Corcoran site is listed as 'Offline', CA folks do not know what that means – Eileen will find out
- Dairies – loads between Corcoran and Porterville
- There are 3 sites (Huron, Corcoran, and Porterville) that go across the valley to span agricultural and anthropogenic emissions
- Need to get information incorporated for the gas/oil activities near Bakersfield

- Mike Newchurch asked if it would be possible to fly over Table Mountain, but this would be a significant diversion from the ground network. Might be considered on departure or return from Palmdale. Does Table Mountain make day observations? They should this winter. Table Mountain is above LA basin pollution for the most part.
- Other targets near Palmdale include Mojave Desert and Edwards AFB (salt flats)
- Main liability for these outlying targets is that they will most likely have to occur at the beginning or end of flights under less than ideal light conditions.
- For UC-12, we can consider refueling in the valley, however, UC-12 needs the Palmdale to Porterville distance to get back to altitude and be ready to make measurements. Rich Ferrare is looking into the possibilities. Palmdale is closer to the operational area than LaRC was during the Maryland deployment.
- New (and lighter) seats on the P-3B have freed up a small amount of weight on the plane. Plan to add a small ammonia instrument from NOAA collaborators (John Nowak and Tom Ryerson)
- Site visit to California is planned for mid-July (week of 16th)
- Discussion of flight plans will begin in April when Mike Singer returns from IceBridge
- Questions were asked about the influence of clouds on flight plans. For instance, do we want to modify plans in CA since there are more clouds? Likely not since high clouds are not the main concern and low clouds tend to be pervasive, though they do tend to clear faster over the cities. Conditions across the valley are mostly homogenous, though fog is more prevalent in the north. If we fly on foggy days, the flight plan and fundamental goals will be very different.
- Still looking for more information on the southwest corner of the valley. It is currently not part of the sampling strategy. Is there anything important in this area?
- When asked, it was reiterated that we are not considering flights over the LA basin, the ground network cannot effectively be extended that far and the primary issues are for PM2.5 in the valley during this time of year.

- Suggestions were made on where to place the 6 additional Pandoras. Based on the NO₂ distribution, maybe 3 more in both Fresno and Bakersfield or at least two more 2 more in these two cities with the last 2 placed in between.
- Brent is looking into placement of the additional Aeronet instruments.
- Both Corcoran and Huron have been identified as possibilities for NATIVE placement. Both sites are at or near schools, so communication with them would be critical (and beneficial). It was noted that the school at Huron is dominated by Spanish speaking students. There are members of the team (e.g., Ruben Delgado) who expressed interest in helping with this as they are fluent speakers and are interested in educational outreach.

Currently expected Ground Assets we need to consider in terms of placement:

- Anne Thompson - NATIVE
- Ray Hoff – MPL, wind lidar (Fresno or Bakersfield?)
- Rich Clark – tethered balloon (east side? Away from airports)

Other possible contributions: Some are free, but others need funding. We will have a small amount of funds to entrain some more expertise, though not a lot. Possibilities are:

- Ellsworth Dutton (NOAA): Mobile radiation lab (free)
- Don Blake (UC-Irvine): VOC canisters at profile sites
- Ramesh Singh (Chapman U.): radiation and aerosol measurements (free)
- Ira Leifer (UC-San Diego): CH₄ and VOCs in the Bakersfield area (free)
- Qi Zhang (UC Davis): Aerosol composition (AMS, PILS, volatility)
- Horizontal scanning lidar (CSU-Chico): contact offered by Clark and Fried
- Ed Eloranta may be available for lidar measurements through funding from Brad Pierce
- Bob Chatfield has a CO₂ contact

Short-term need is to get basin information on DISCOVER-AQ California on the website.

Both the presentation files and updated kmz file will be provided with these notes.

Data Tasks	Contact
Calibrate and resubmit DLH water vapor (complete by end of March)	Diskin
Update P-3B data merge (after DLH resubmission)	Chen
Update NO _y data to provide additional guidance on uncertainty	Weinheimer
Detailed comparison of LIF and CL NO ₂ to provide best estimate profiles with appropriate uncertainty	Weinheimer and Cohen
Correct data definition for Aldino and Beltsville NO ₂ (should be NO _y -NO)	Chen
Investigate noisy ozone data for Beltsville during AM periods 20-29 July	Hains and Joseph
Apply corrections to MDE surface ozone data	Chen and Long
Archive provisional research product for Pandora CH ₂ O	Cede and Herman
Obtain and archive PAMS hydrocarbon data	Hains and Chen
Archive surface and balloon observations from Beltsville	Fuentes and Joseph
Archive VOC observations from Edgewood	Thompson
Archive VOC observations from the UMD Cessna	Stehr
Integrated comparison of P-3B, ozonesonde, tethered balloon, and ground observations	Chen

Archival of Raw Data and Documentation files

- Transfer files via ftp to xfr140.larc.nasa.gov
- Use FTP client software; ftp will not work through your browser
- Login with the following credentials
username:
password:
- Immediately change directory to ingest/FieldCampaigns
- Deadline is 1 May 2012
- Uploaded files must be named according to the following convention:
DISCOVERAQ_PILastName_Instrument... (date, volume, etc. as needed)
- Recommend placing data and documentation files into one or more zip files named according to the convention for upload
- ICARTT format is NOT required for these files
- Documentation needs to include an instrument description (may be a publication) that includes any specific modification or operational details peculiar to this deployment.
- Stored files should contain all data/programs/documents necessary for the PI to reprocess data if needed.

Vertical variability in NO_2 and temporal variability of HCHO was greater than we expected.

Oxidizing power of the atmosphere appeared to be limited by water vapor – oxygenated species such as HCHO correlated with water vapor

Lower troposphere was much cleaner than we anticipated, especially for NO_x

Strong correlation of surface O_3 with column amounts from P-3B profile integrations. Implies that measurements from a GEO-CAPE instrument capable of sensing the lower troposphere should be representative of surface ozone

Moderate correlation of surface NO_2 with observed column amounts

Cases of more afternoon O_3 observed over Chesapeake Bay (by 10-20 ppbv) than at nearby land-based sites; models tend to overemphasize this difference

Strong impact of boundary layer depth and relative humidity on the relationship between aerosol optical depth (AOD) and surface $PM_{2.5}$

Initial comparisons of MODIS 3-km resolution AOD with AERONET/DRAGON look good

The first time column-retrieved urban industrial aerosol SSAs have been shown comparable to in situ retrievals of SSA.

Remote sensing suggests rapid formation of sulfate aerosol associated with fair weather cumulus clouds

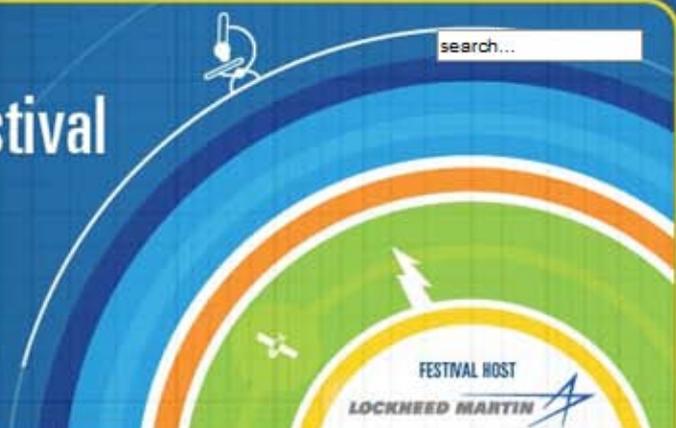
Substantial land-water variability in boundary layer (BL) depth noted based on HSRL data

Extensive evaluation of air quality models underway – NOAA CMAQ forecast model underestimated O_3 above the BL; HCHO and isoprene underestimated within the BL; NO_2 compared well with observations, but peroxy nitrates overestimated, which implies NO emissions too large; BL depths over Bay too low on some days



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What:
Science Festival

Outreach opportunity in Washington DC on 28-29 April, looking for volunteers to represent DISCOVER-AQ

DISCOVER-AQ will be highlighted on the NASA hyperwall

Looking into the possibility of having an Aeronet and Pandora instrument on display (unfortunately, the event is indoors, so no active measurements)

Other ideas?

Find details at <http://www.usasciencefestival.org/>

Ground Assets: Co-investigators

Brent Holben (NASA GSFC)	Aeronet/DRAGON
Jay Herman (UMBC)	Pandora
Anne Thompson (Penn State)	NATIVE trailer and ozonesondes
Ray Hoff (UMBC)	UMBC lidars
Rich Clark (Millersville)	Tethered Balloon

Ground Assets: Potential collaborators

Russell Long and Jim Szykman	Photolytic NO ₂ at two locations
Ellsworth Dutton (NOAA)	Mobile Radiation Lab
Don Blake (UC-Irvine)	Whole Air Samples at profile sites
Saewung Kim (UC-Irvine)	TBD (CIMS, PTR-ToF-MS, cavity ringdown NO ₂)
Ira Leifer (UCSD)	CH ₄ and NMHCs (Bakersfield)
Qi Zhang (UC-Davis)	AMS and other TBD (Fresno)
Ramesh Singh (Chapman)	MICROTOPS, Pyranometer, Aethalometer, Ecotech MicroVol 1100 Particulate Sampler

Special Issue: DISCOVER-AQ and the Processes Impacting NEar-Surface Atmospheric Pollutants (DISCOVER PINESAP)

Sample manuscripts to be considered in the special issue of Journal of Atmospheric Chemistry



Lead author	Manuscript title	Manuscript status
Anne M. Thompson	Ozone profiles in the Baltimore-Washington region (2005-2011): Climatology, satellite comparisons, and DISCOVER-AQ case studies	
Andra A. Reed	A Comparison of satellite and ground-based measurements of total column ozone and nitrogen dioxide from Edgewood, MD: July 2011	
Ryan M. Stauffer	Bay breeze impact on surface ozone at Edgewood, MD, USA	
Gregory G. Garner	Evaluation of the experimental Community Multiscale Air Quality (CMAQ) modeling system during DISCOVER-AQ	
Douglas Martins	Column-surface comparisons of ozone at a complex coastal site	
David Doughty	On the nocturnal decay of isoprene in a semi-urban environment	
Kevin Sanchez	Controls on ozone and aerosol distribution in the atmospheric surface layer of a semi-urban environment	
Jose D Fuentes	Mass spectral and size attributes of particles in Beltsville, MD USA during summer 2009	
Xiaoming Hu	Why air quality in the mid Atlantic region during summer 2011 was good despite abnormally warm conditions	
Hans Verlinde	Long-term ozone trends and influences of low-level jet on diurnal ozone patterns at Beltsville, Maryland	
Ricardo Sakai, Everette Joseph, Jose D Fuentes, David Doughty, Kevin Sanchez, and John Moore	Overview of atmospheric processes in the PBL and its interaction with ozone during Discover-AQ 2010	
Xiaoming Hu, Petra M Klein, M Xue, Fuging Zhang, David C Doughty, Jose D Fuentes	Impact of low level jet-induced leaking of the residual layer on boundary layer ozone	
William R. Stockwell	An investigation of the rates of tropospheric ozone formation: Mechanisms verses DISCOVER reality	
Anna Schneider, Jose D Fuentes, Everette Joseph, and Anne Thompson	Meteorological controls on summertime tropospheric ozone at Beltsville, MD	
Hannah Halliday	Temporal and Altitude Trends in Volatile Organic Compound Reactivity and Variability in the Mid-Atlantic	

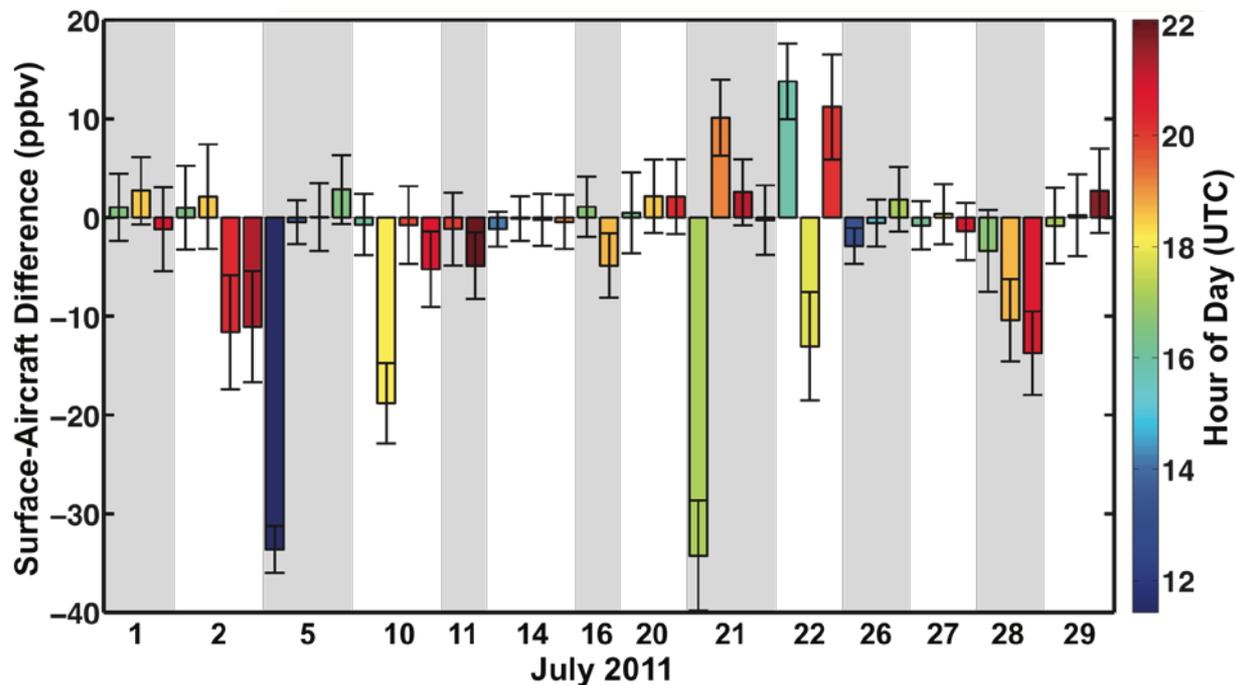
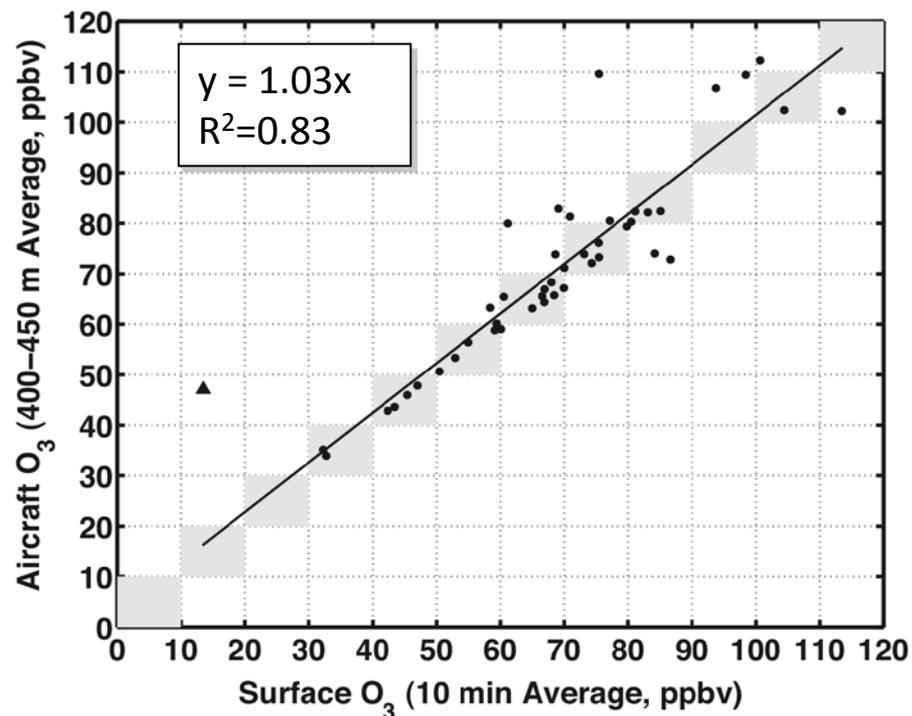
DISCOVER-AQ Edgewood, MD July 2011 Aircraft/Surface Comparison

Regression Plot

- 45 Profiles
- Morning Point (*triangle*) Excluded from Regression
- Results insensitive to averaging ranges between 380-520 m for aircraft and 5-30 min for surface
- Mean bias = -2.0 ± 1.2
- n-RMSE = 9.8%

Bar Plot

- Averages: Aircraft (400-450 m); Surface (10 minute)
- Error bars are propagated uncertainties from the difference calculation
- Differences are significant on 33% of the profiles
- No clear diurnal behavior



NATIVE vs. (Aldino, Beltsville, Essex, Fair Hill, Padonia) 8hr avgs

Days with bay breeze -> NATIVE **10.8** ppbv higher 8hr avg

Days without -> NATIVE 0.3 ppbv higher 8hr avg

