Ground-based Aura Validation: Updates on NATIVE Facility, SHADOZ & IONS Sondes

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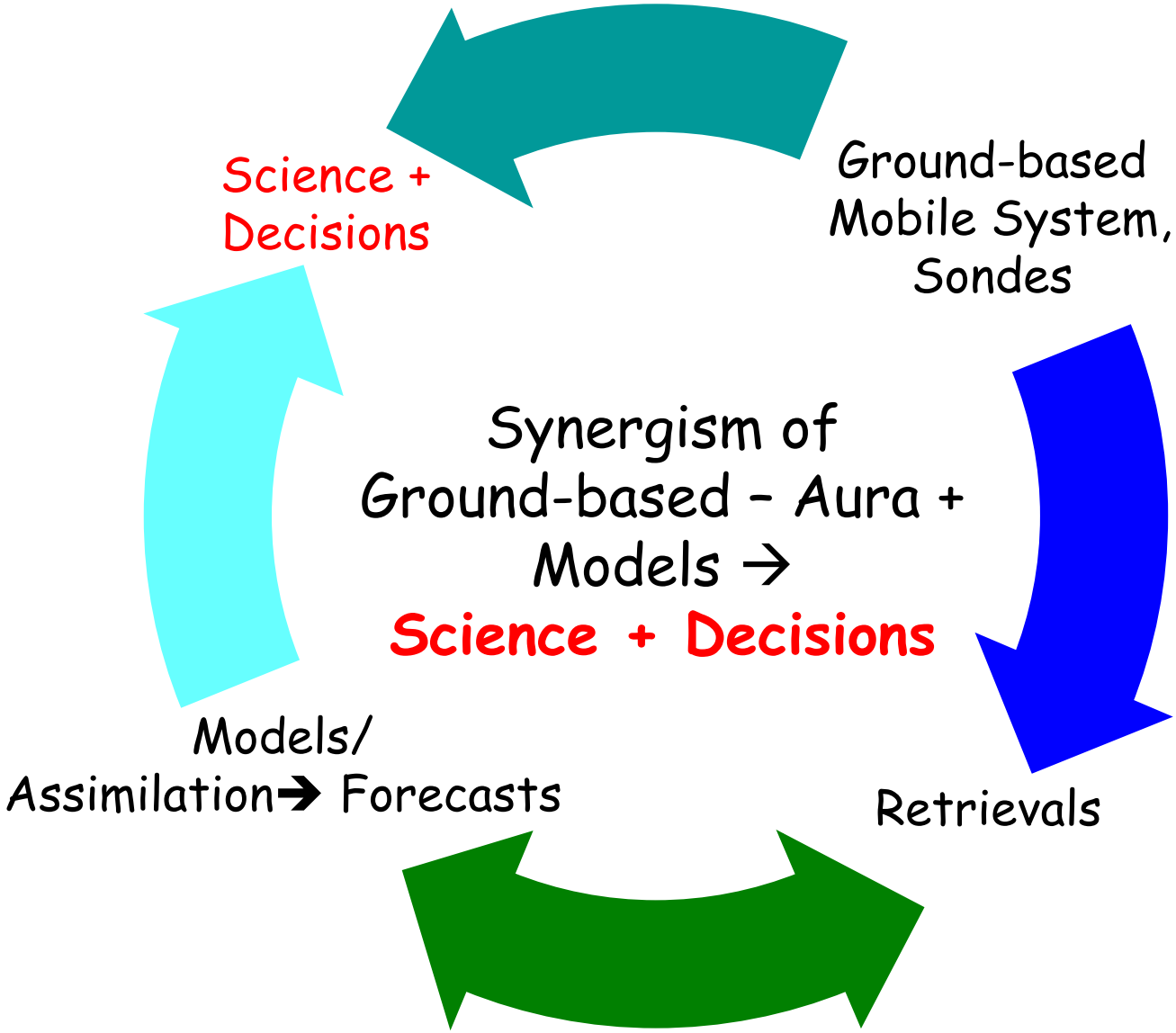
SHADOZ, IONS Teams

Aura Validation Meeting, Lanham
22 September 2005

Presentation

- Ground-based Aura validation in scientific context
- **SHADOZ --** 2005 Update (two new stations)
- **IONS–04** -- Part of INTEX-NA
  - Aura anticipated
  - Proof of concept for ground-based strategy
- **NATIVE** (Nittany Atmospheric Trailer and Integrated Validation Experiment) Update
  - 2006 deployment
  - IONS-06 approved


Science +
Decisions
Ground-based
Mobile System,
Sondes
Synergism of
Ground-based – Aura +
Models →
Science + Decisions
Models/
Assimilation→ Forecasts
Retrievals

SHADOZ* - 2005 Aura Status

- **SHADOZ for Aura - Launches adjusted to overpass.**
  - **Data turnaround faster – Aura data format**
  - **Now > 3000 sondes, <http: croc.gsfc.nasa.gov/shadoz>**
  - **Data transmission to AVDC: <http://avdc.gsfc.nasa.gov>**
- **New 2005 SHADOZ sites:**
  - **Cotonou, Benin; Alajuela, Costa Rica; Next: Easter Island**

***** Thompson et al, *JGR*, **108**, D2, 8238, 2001JD000967, 2003

SHADOZ - 2005

Participants	Affiliation	Country
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Masato Shiotani	Kyoto University	Japan
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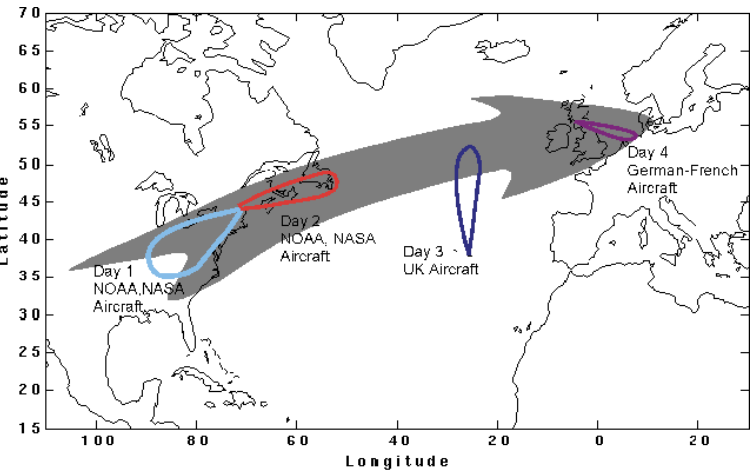
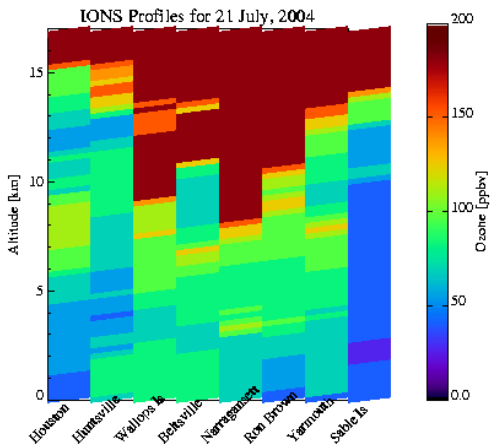
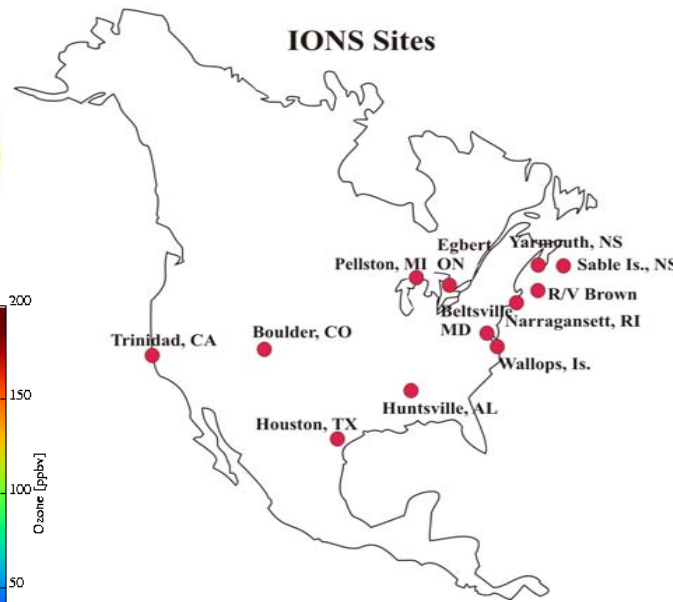
IONS - Mid-Latitude Network (2004)

Design No. American O_3 sonde network for INTEX – NA (2004):

1. Can O_3 pollution be followed *during ICARTT?*
2. Can budgets of O_3 due to ST; Lightning (L); Regional-Convection (RC) interaction; Advection (A) be deconvoluted?
3. Aura validation planned – near miss







Proof of Concept for NATIVE

Summers 2004, 2005

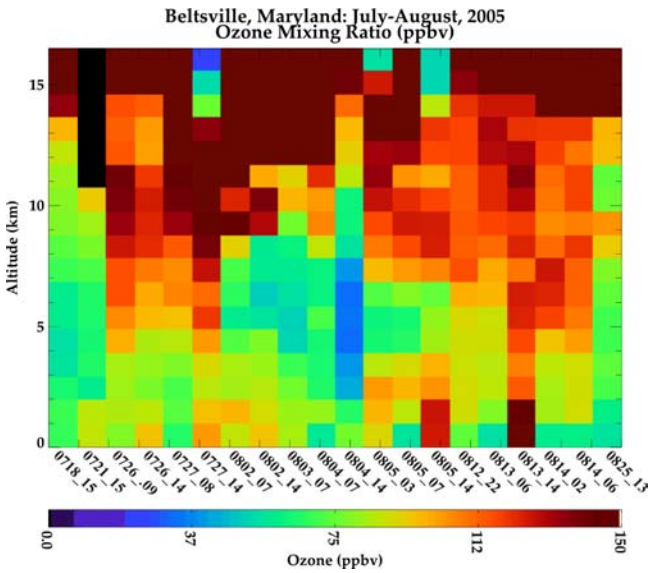
Sounding program with GSFC, Howard U., PSU at Beltsville site (right)

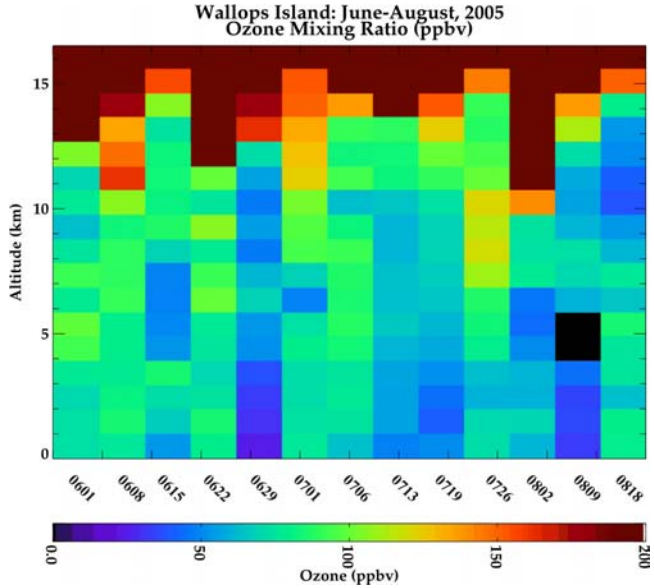
IONS fast turn-around flight planning.

Soundings at AVDC. Images at: http://croc.gsfc.nasa.gov/intex/ions

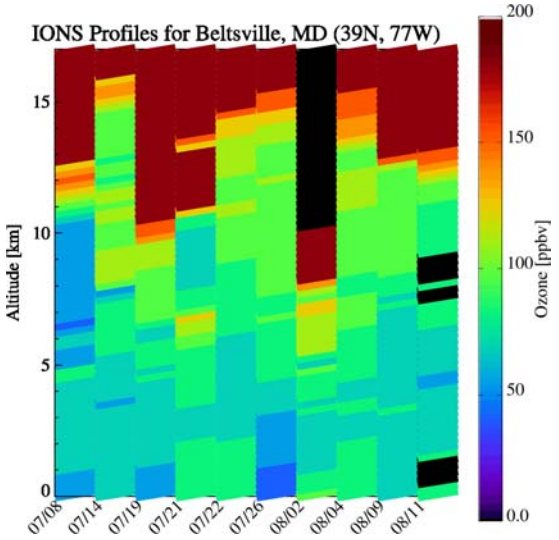
Value of on-going soundings for Aura illustrated by 2004-2005 contrast: Beltsville & Wallops

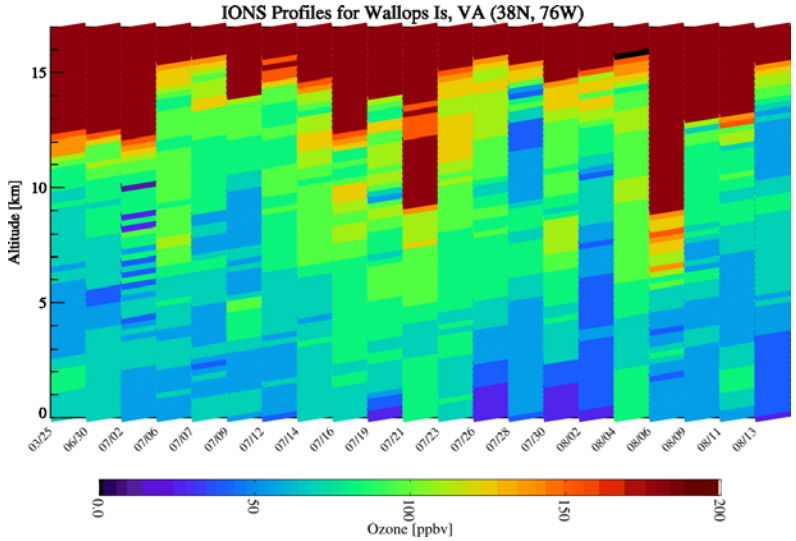
The Summer that was hot (2005)





… and the one that was not (2004)

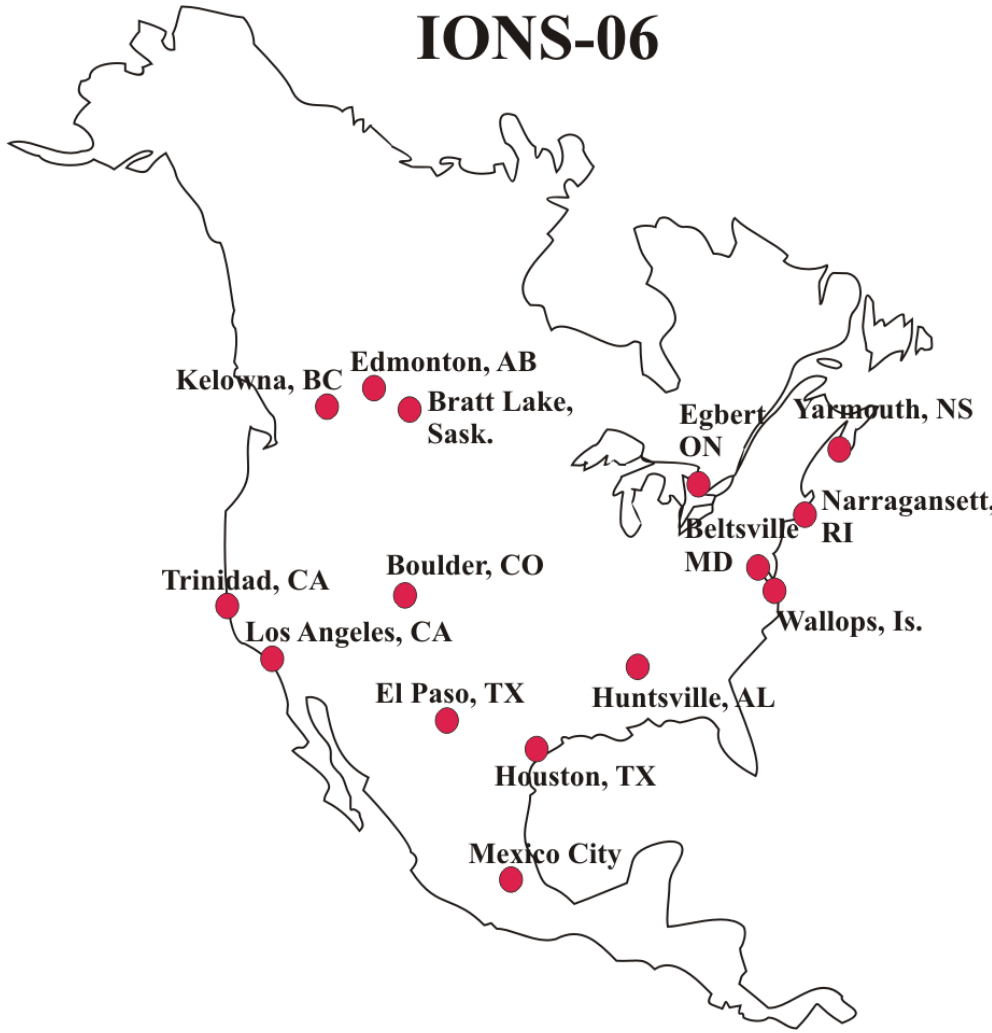




IONS-06 for Aura

- Milagro emphasis –
  - South central US, Mexico (March)
  - NW US, SW Canada (April-May)
- Same PI/Co-I Team &

  GSFC fast turn-around as 2004
- Leverage funding – NASA, NOAA, universities, EC



NATIVE - Features

Standard 20' Container

- **Continuous operations for pollution statistics with core instrumentation**
- **Easy deployment during aircraft missions**
- **Augment with soundings, specialized instruments during intensives**
- **Rapid data transfer to local website, AVDC (Aura Validation Data Center)**

NATIVE Basic Payload *

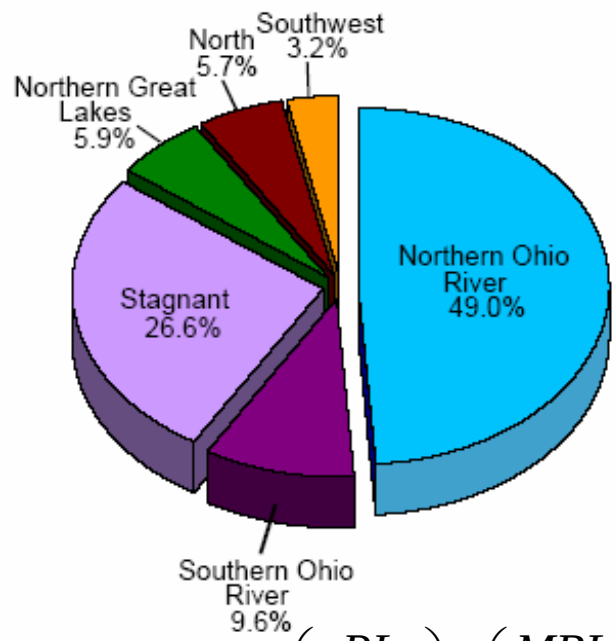
- TeCo Ozone Analyzer
- TeCo CO Analyzer
- TeCo SO_2 Analyzer
- TeCo NO-NO_y Analyzer
- Ozonesonde Preparation Setup & Ground Station
- MicroTops Ozone, Aerosol Sun Photometers
- YES UVMFR-7
- Cimel Sunphotometer
- PIXE Streaker
- TSI CPC and SMPS

* Can accommodate, partner with MF DOAS, YES RSS-1024, AERI, in-situ aerosol optical properties, **UV spectrometer

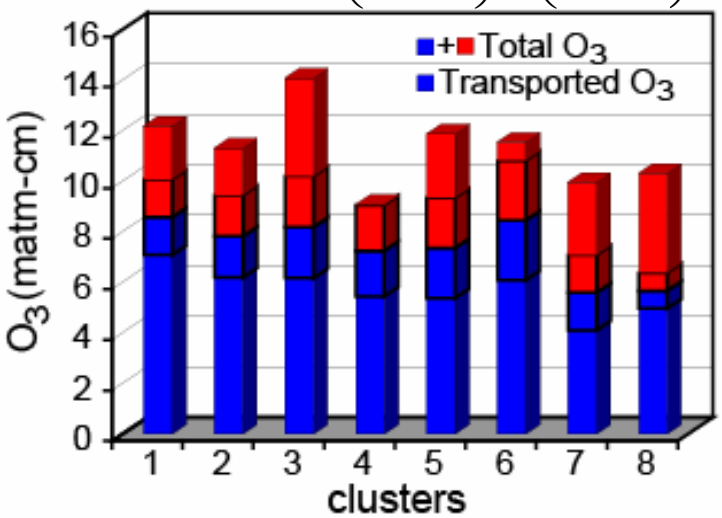
NATIVE – Deployment Schedule

2005		2006		2007	
3Q	4Q	1-2Q	3Q	1Q	2Q
Container assembly; Beltsville sondes	Testing, calibration	MILAGRO Houston MILAGRO NW US - TBD	Beltsville; Houston ?	Guam AVE/ TC4	AVE/ Ellington

Value of On-Going Measurements



$$O_3 \text{ transported} = \left(\frac{RL}{MBL}\right) \times \left(\frac{MBL}{ABL}\right)$$



Eastern U.S. climatological airborne data were used to apportion sources, calculate transport patterns, and quantify regionally transported ozone (55-82%).

Implications for Aura:
-Continuous airborne and surface measurements are necessary for validation of polluted regions.
-Characteristic transport and meteorological patterns lead to distinct profiles for trace gases and aerosols.

(Taubman et al., 2005, in press)