

Ground-based Milagro/INTEX-B Measurements & Aura Validation: IONS-06 Sondes & NATIVE

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**With: B. Taubman, W. Brune, PSU
J. Witte, SSAI/GSFC & IONS Team**

**Milagro/INTEX-B Meetings, Boulder
October 2005**

Presentation

IONS-04 -- INTEX-NA

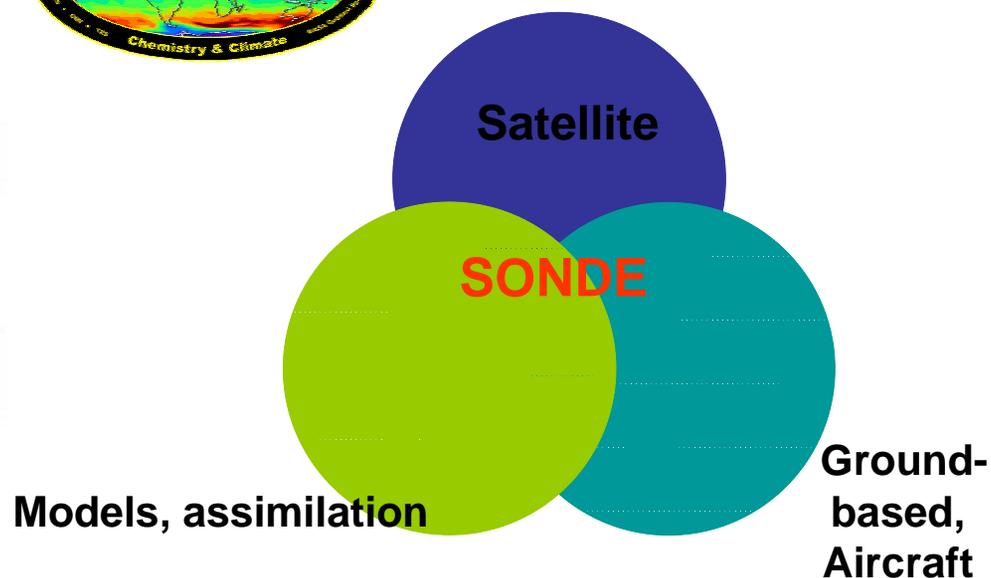
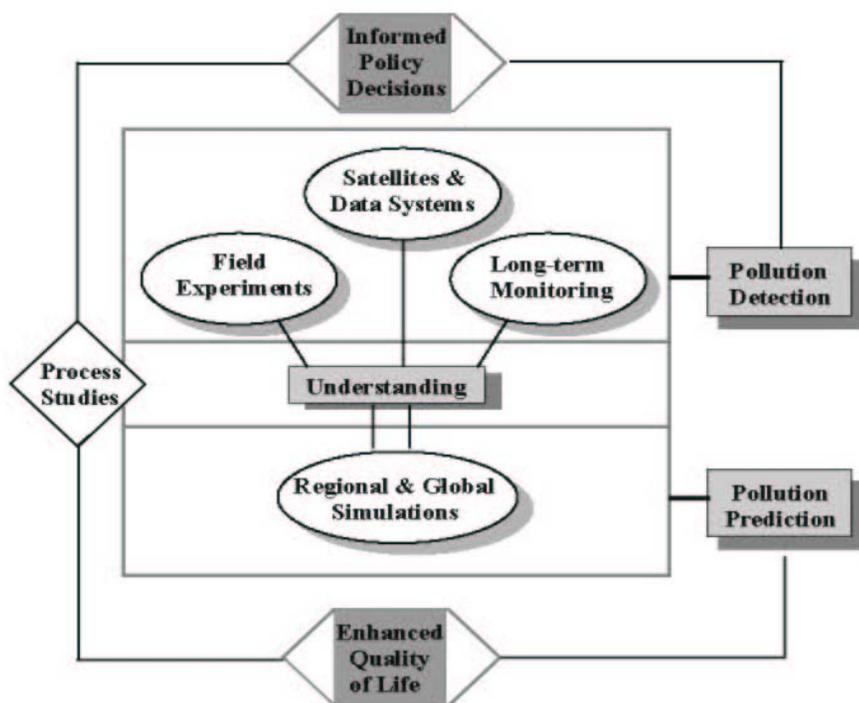
- Operational sounding sites selected for scientific goals, mission objectives & satellite validation
- Proof of concept for ground-based strategy
- Aura anticipated

IONS-06 -- Supporting Milagro/INTEX-B
(TBD - Texas in August for NOAA, DOE)

NATIVE (Nittany Atmospheric Trailer and Integrated Validation Experiment) – will deploy in **INTEX-B**

Ozonesondes Integrate Satellites, In-situ, Models

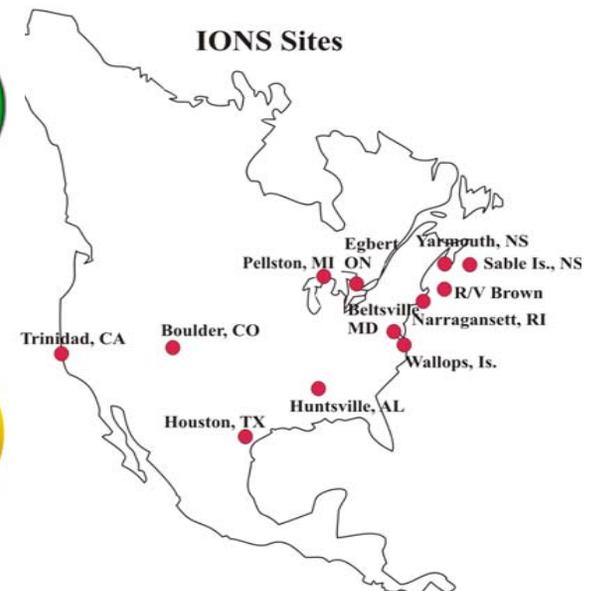
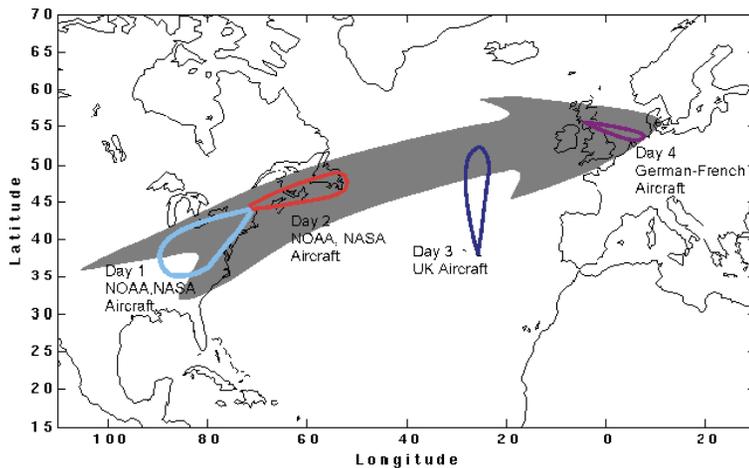
- Profile can guide satellite ozone retrieval, assimilation
- Sonde Advantages – consistent location, timing, vertical resolution – full troposphere sampled & up to 7 mb



IONS - INTEX Ozoneprobe Network Study

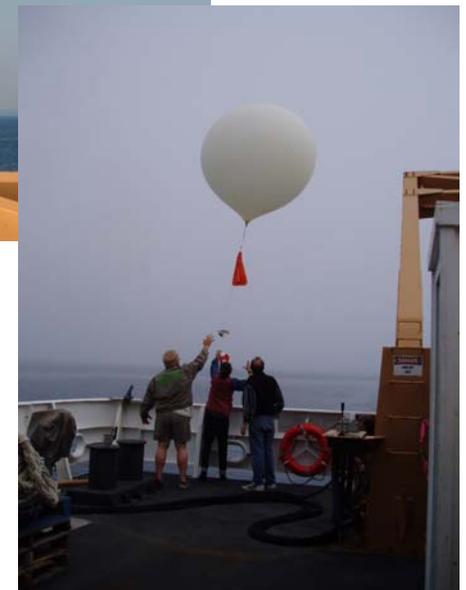
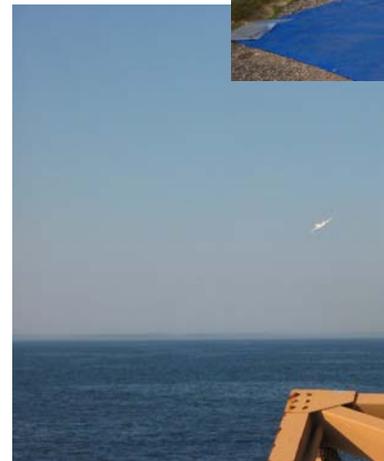
Design No. American O₃ sonde network for INTEX – NA (2004):

1. Can O₃ pollution be followed *during ICARTT*?
2. Can intercontinental transport – trans-Atlantic, trans-Pacific be quantified?
3. Can O₃ from STE, Lightning, Regional-Convection interaction, Advection be deconvoluted?
4. Support Data Assimilation, Aura validation

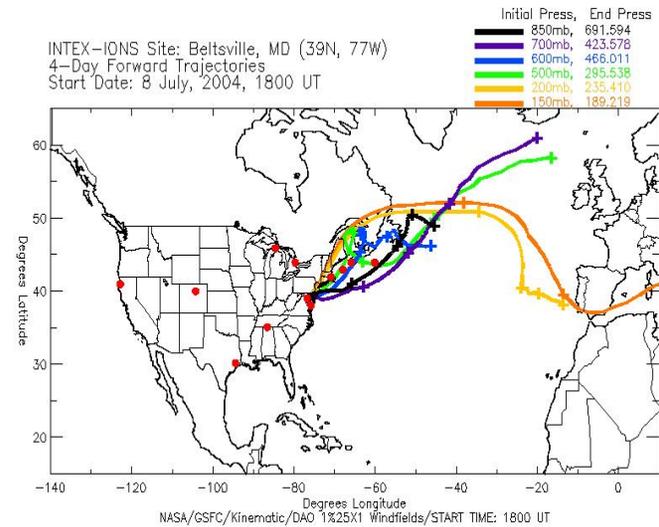
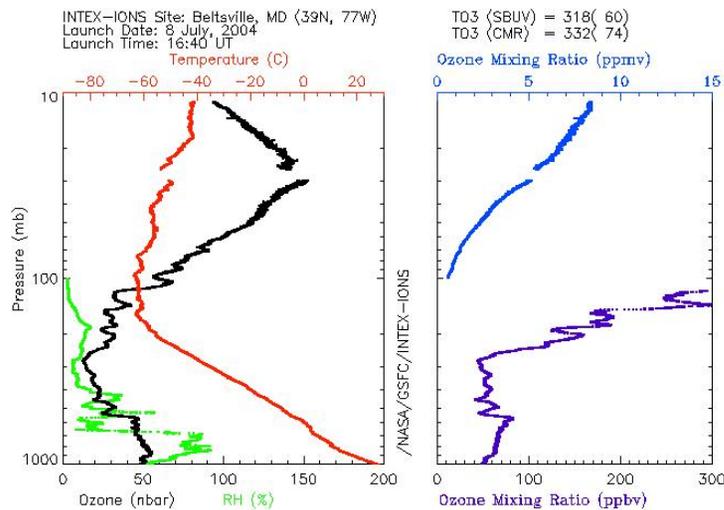


IONS – 2004: (INTEX Ozonesonde Network Study)

- Design objectives met
- Central US/Canada → eastern outflow (MI, TO); SC to NE US/maritime flow
- Eight NE/NA sites, *R H Brown*
 - Lagrangian Flight Planning
 - Launch, aircraft coordination
- Operated 6 weeks, July-August; 6 sites daily: > 290 sondes
- Images -
<http://croc.gsfc.nasa.gov/intex/ions.html>. Data at cloud1.arc.nasa.gov

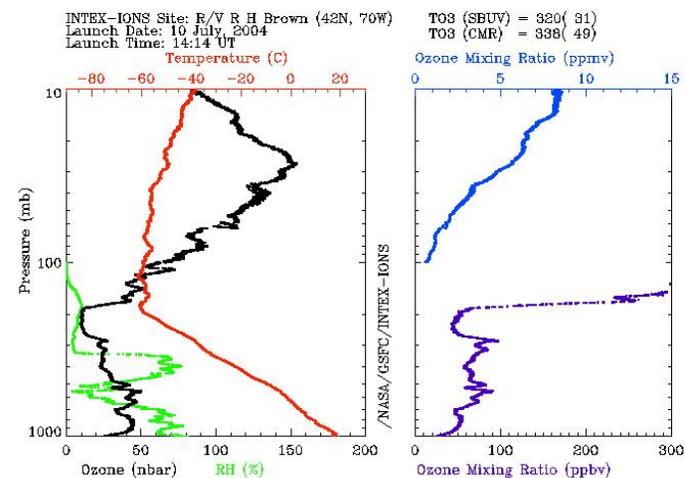


IONS – Success in Lagrangian Operations



Ozone at 500 hPa from Beltsville predicted to arrive at *RH Brown* two days later, and did so.

<<http://croc.gsfc.nasa.gov/intex/ions.html>>



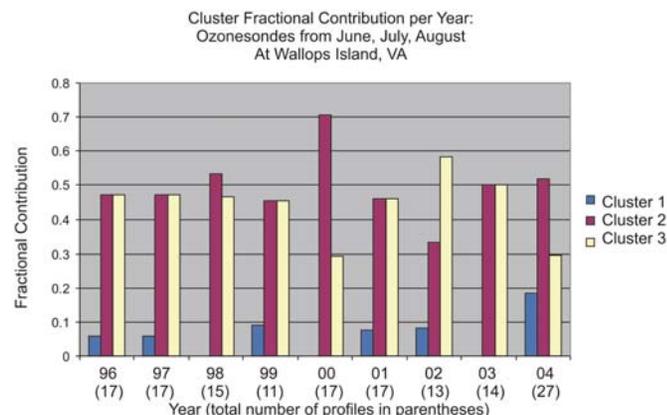
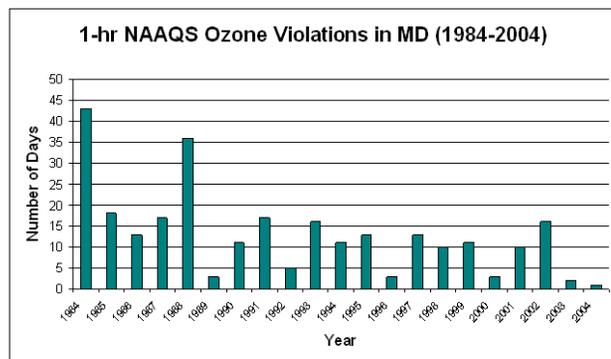
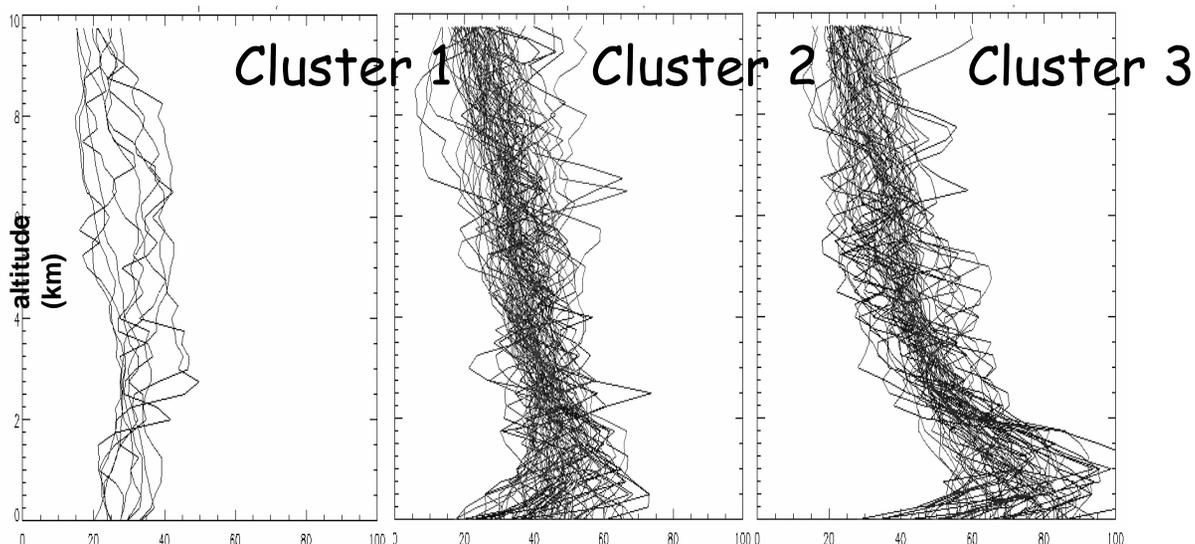
IONS-04 Science Result 1: Wallops Long-Term Record Shows *“Summer That Wasn’t”*

“Clustered WFF 1996-2004 Profiles in Three Classes:

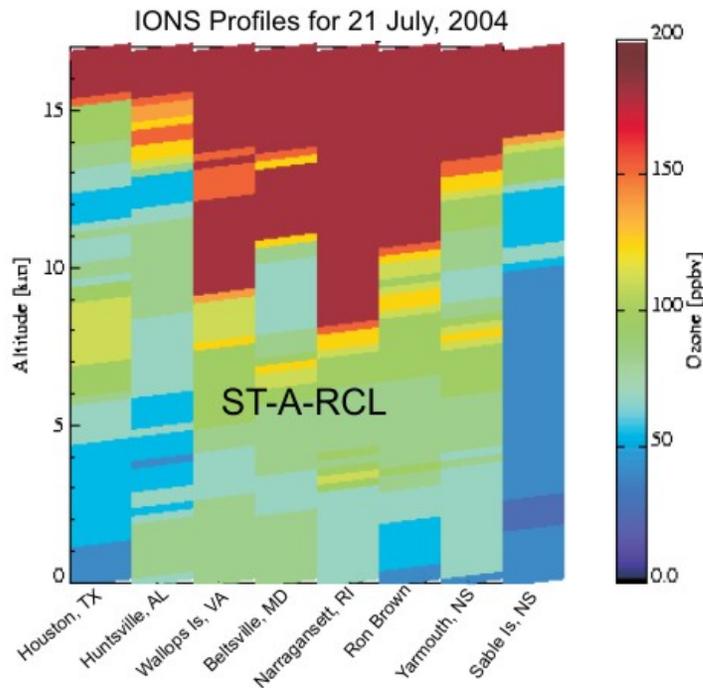
(1) = Clean/low pollution. Class (2), (3) Differ in Lower trop O₃ pollution amount.

- 2004 – cleanest year
- 2004 cleanest mid-Atlantic Surface of 20 years!

INTEX Synergism:
-- Complement AQ
-- Insights from LT
Validation site



IONS-04 Science Result 2: NE Sites Show High Strat-to-Trop Influence



ST-A-RCL = Mixed Strat, Advected Pollution, Regional-convection-Lightning budgets

- Comparison to WFF, Tracers (pv) → 2004 UT/LS “Spring in Summer” Typical

INTEX Synergism:

- **AQ Model Comparisons** – AGU Session (McKeen, Tarasick, Carmichael, Pierce)
- **Analysis & Model Evaluation** – AGU: Thompson (Laminae Budgets); G. Pfister (MOZART), Cooper/Trainer (NOAA-FLEX-PART)
- **Integrated Observations** – AMS-06, Avery

IONS-06 for INTEX-B/Milagro/Aura: Design Strategy

- **INTEX-B**

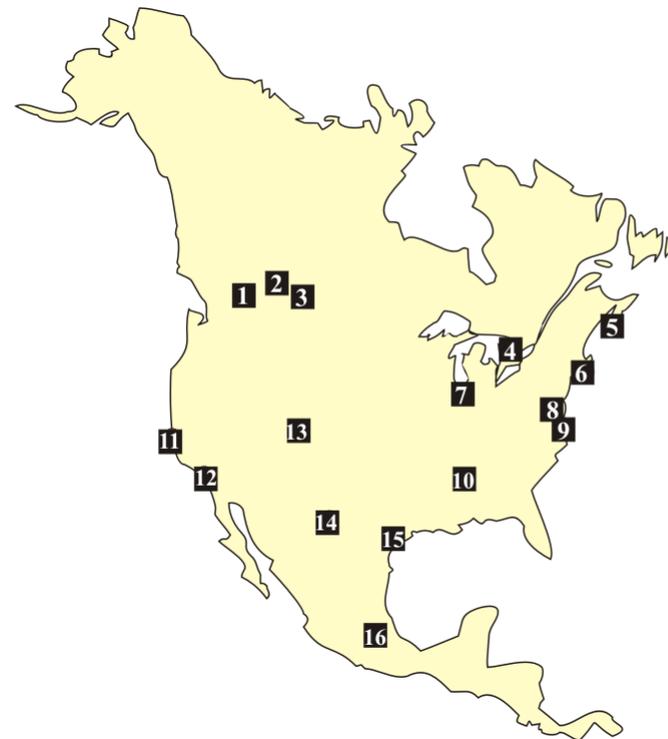
- West Coast/ SW Canada
Inflow – Sites 1-3, 11, 12
- Cross-Continent ->
Outflow – Sites 4-9

- **Milagro**

- Mexico City (T1)
- Sites 10, 15

- **Aura**

- All !
- Add NATIVE – central
Wash during INTEX-B

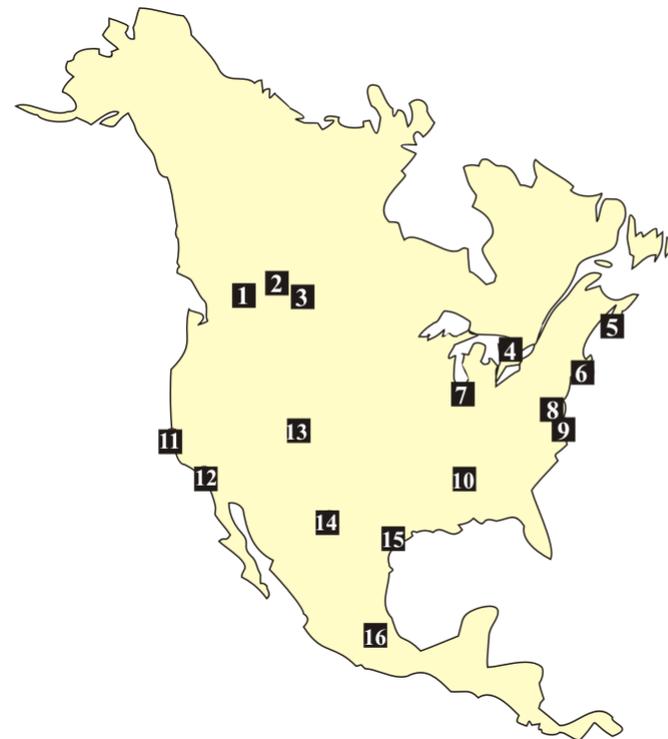


IONS-06 Sites

- 1 - Kelowna, BC
- 2 - Edmonston, AB
- 3 - Bratt Lake, Sask.
- 4 - Egbert, ON
- 5 - Yarmouth, NS
- 6 - Narragansett, RI
- 7 - Valparaiso, IN
- 8 - Beltsville, MD
- 9 - Wallops Is., VA
- 10 - Huntsville, AL
- 11 - Trinidad Head, CA
- 12 - Los Angeles, CA
- 13 - Boulder, CO
- 14 - El Paso, TX
- 15 - Houston, TX
- 16 - Mexico City

IONS-06 for INTEX-B/Milagro/Aura

- Deployment Plan:
 - In Progress with NOAA (SJO), Co-Is (March-May)
 - Goal – Extend to August NOAA/DOE Texas Campaign
- Same IONS Team, GSFC fast turn-around as 2004
- Leverage funding – NASA, NOAA, universities, EC



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IONS-06

Participants	Site Co-I
Anne Thompson, PSU - Principal Investigator	NATIVE; Mexico City; Tentative - SW US, LA
Jacquelyn Witte, SSAI – IONS-Aura Archiver	SSAI, NASA/GSFC
Samuel Oltmans, NOAA/CMDL	Trinidad Head, CA; Boulder, CO
Everette Joseph, Howard Univ	Beltsville, MD
John Merrill, URI	Narragansett, RI
Gary Morris, Valparaiso Univ, Rice Univ	Valparaiso, IN; Houston, TX
Michael Newchurch, Univ Ala - Huntsville	Huntsville, AL
Frank Schmidlin, NASA Wallops	Wallops Island, VA
David Tarasick, Environment Canada	Canada: BC, AL, SK, ONT, NS

NATIVE - Features



Nittany Atmospheric Trailer &
Integrated Validation Experiment

- **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 SO₂ 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
- * Partner with **MF DOAS**, YES RSS-1024, AERI, in-situ aerosol optical properties, **UV spectrometer