



### Airborne Science Program

#### Observing Platforms for Earth System Science Investigations



**WB-57**



**Global Hawk**



**ER-2**



**G III**



**Learjet**



**DC-8**



**Ikhana**



**P-3**



**S-3B**



**B-200**

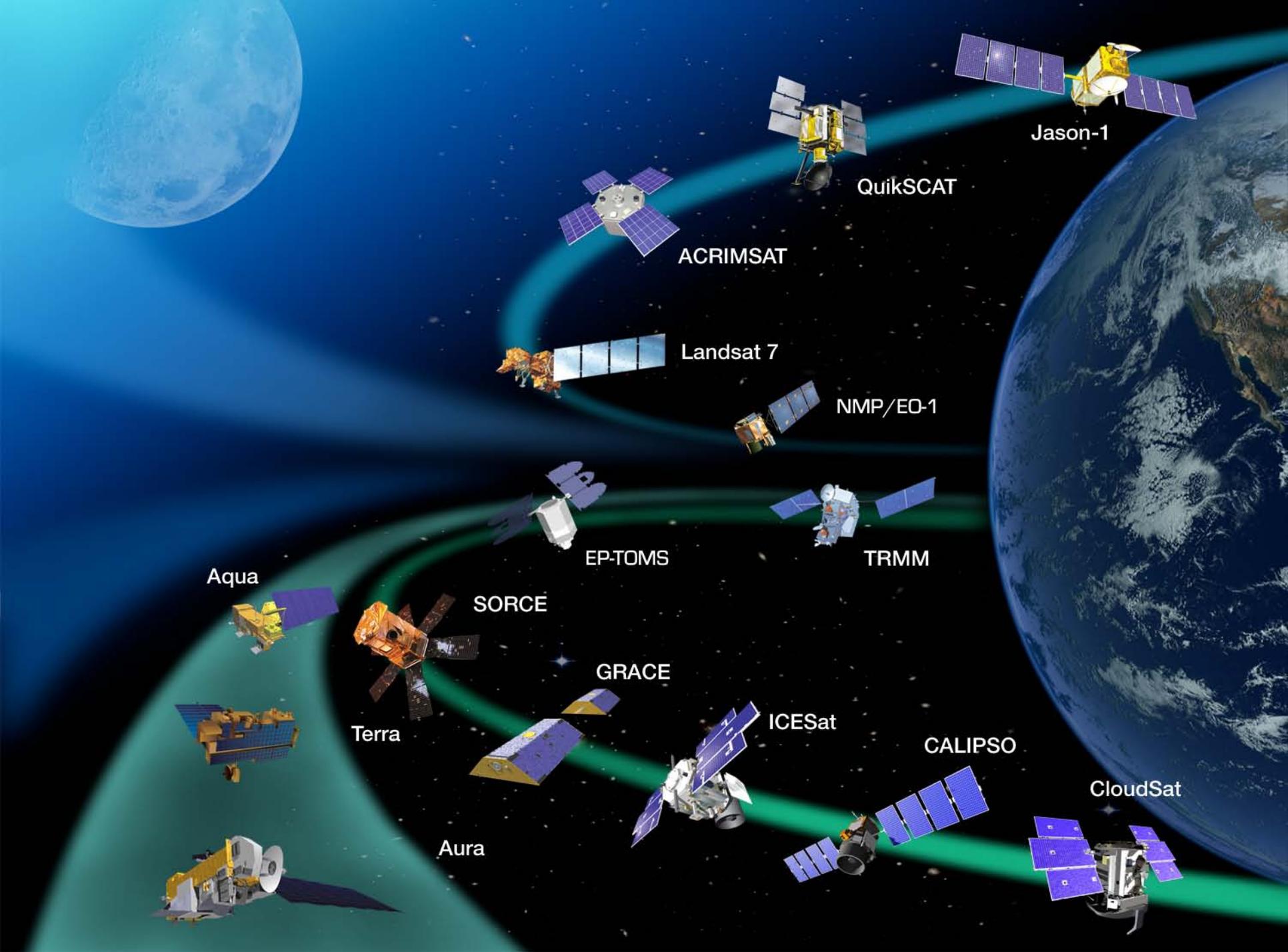


**Roberts  
Twin Otter**



**SIERRA**

10/28/2008



Jason-1

QuikSCAT

ACRIMSAT

Landsat 7

NMP/EO-1

EP-TOMS

TRMM

Aqua

SORCE

GRACE

Terra

ICESat

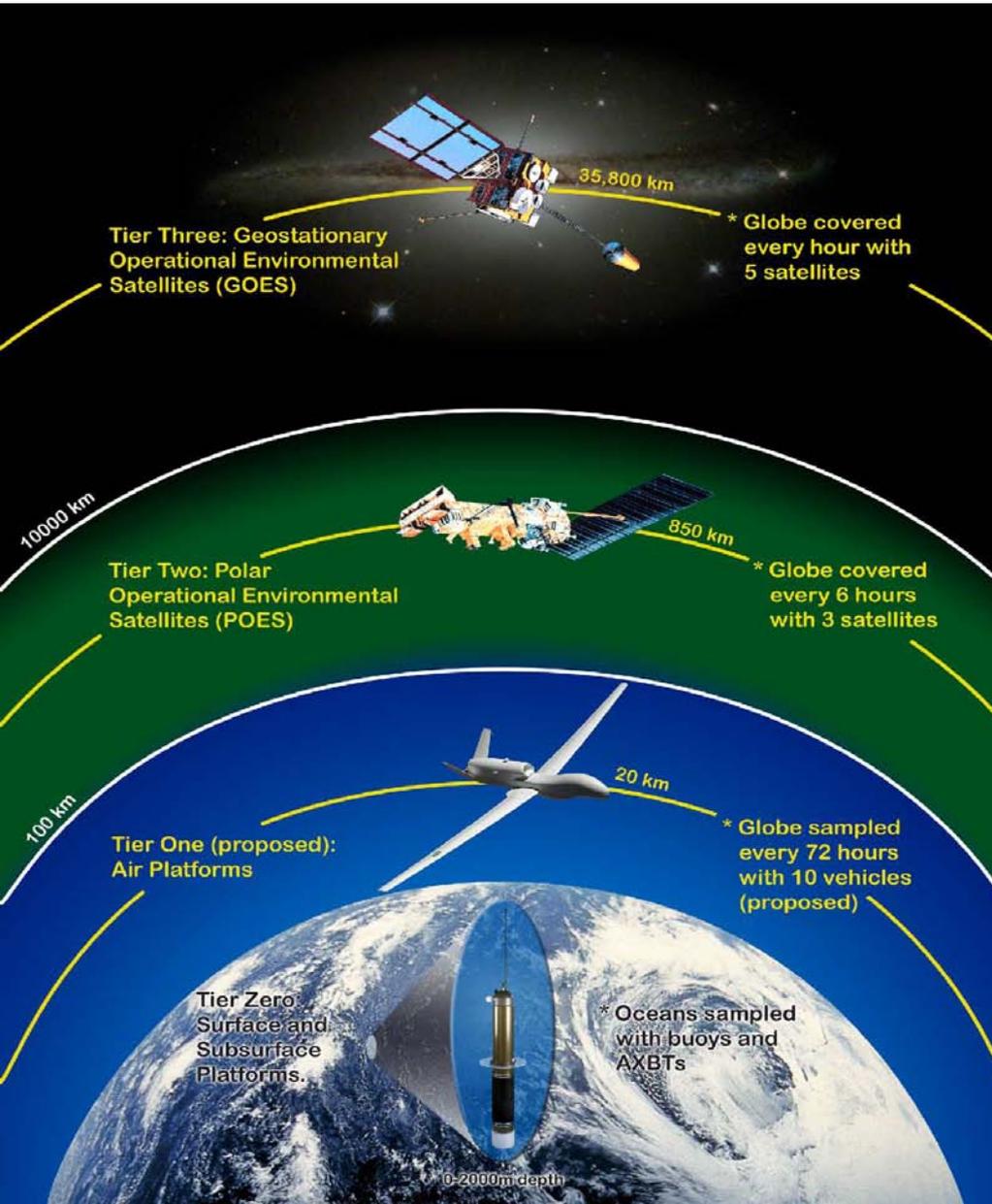
CALIPSO

CloudSat

Aura



# Airborne Science Program



## Program Objectives:

### Satellite Calibration and Validation

Provide best value methods to perform the cal/val requirements for Earth Observing System satellites

### New Sensor Development

Provide best value methods to reduce risk for new sensor concepts and algorithm development prior to committing sensors to spacecraft

### Process Studies

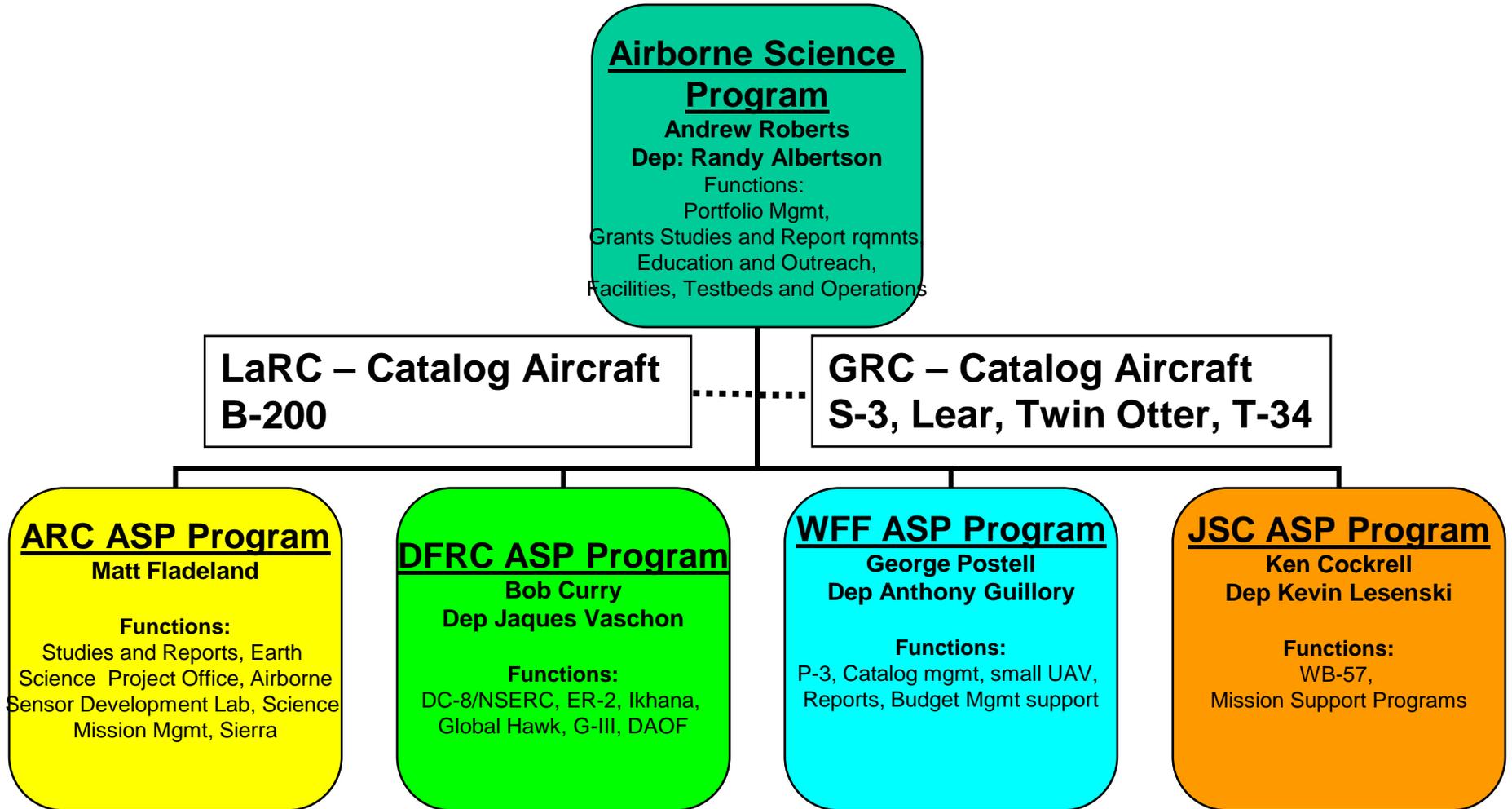
Facilitate best value to acquire high spatial/temporal resolution focused measurements that are required to understand small atmospheric and surface structures which generate powerful Earth system effects.

### Next Generation NASA Scientist and Engineer Development

Facilitate the development of our future NASA workforce by maturing our PI's, Project Scientist, Instrument Engineers, science management. Airborne programs typically last 12 to 24 months and as compared to satellite going years to decades on one project.



# Airborne Science Program





# Airborne Science Program Direction



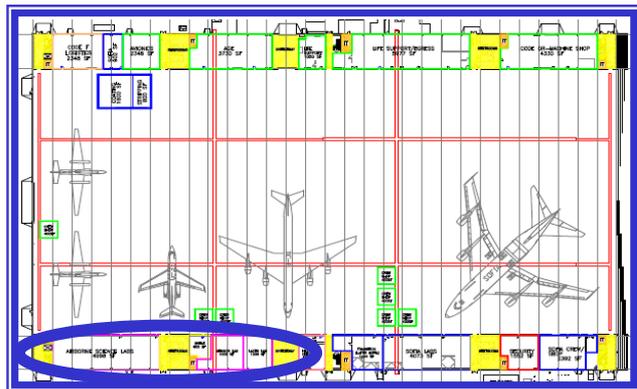
- Establishing a new facility at Palmdale for Airborne Science
- Increased Focus on Core Aircraft – maintaining and upgrading
- Adding Global Hawks to Core aircraft
- Going from National Science Objectives to Required Measurements to Platform Selection
  - Released Requirements Document
- Sensor Portability
- New Data Distribution System based on IWGADTS standards in Core fleet - NASDAT
- Intercenter integration process - JASSIWG
- Develop bridges to our national and international airborne science community
- Strengthen ICCAGRA
- Work with ICORSE
- Significant participation with ISRSE 09
- Programatics
  - Quarterly news letter
  - Airborne Science recognition program
  - History capture program
  - Budget Stabilization



# Airborne Science Capability Additions and Program Stabilization



**NASA Airborne  
Science Facility in  
Palmdale**

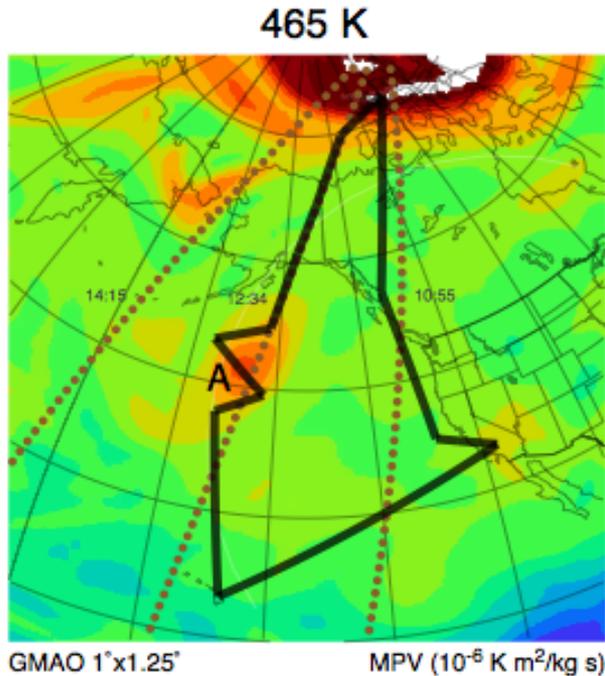


NASA Dryden Flight Research Center Photo Collection  
<http://www.dfrc.nasa.gov/Gallery/Photo/index.html>

NASA Photo: ED08-0022-01 Date: January 17, 2008 Photo By: Tom Tschida

The Dryden Aircraft Operations Facility in Palmdale, Calif., is now home to two large science aircraft, NASA's SOFIA observatory and a DC-8 science laboratory.

# GLOPAC vortex fragment mission



30 hour flight

Objective 1: sample remaining polar vortex for ozone depleted air

Objective 2: sample polar fragment over Pacific

Objective 3: Coordination with Aura satellite overpass

Objective 4: Pole-to-tropics sampling of air masses



# Western States Fire Mission 08



**Gov. Arnold Schwarzenegger** credited an unmanned NASA aircraft Monday with helping save the Sierra foothills town of Paradise from a wildfire last week, calling the plane "one of the most exciting new weapons in our firefighting arsenal."

**Canyon Complex Situation Unit Leader, Randy Herrin ...**

"Thanks for the imagery on the Canyon Complex. I was able to follow along on the CDE and video and show the project to the Operations Chief and Deputy IC. They were impressed to say the least. The imagery showed a significant amount of heat in the SW of our complex, which we were not expecting, so that was good to know. Congratulations to everyone on another successful mission."

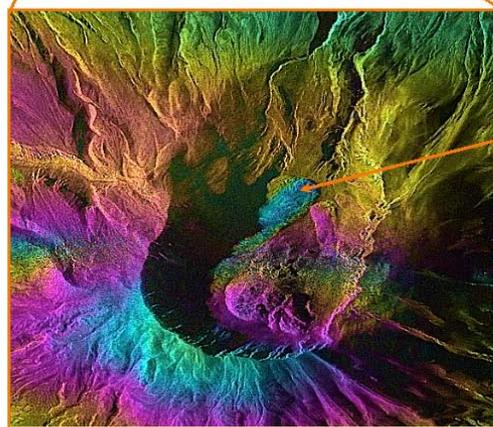
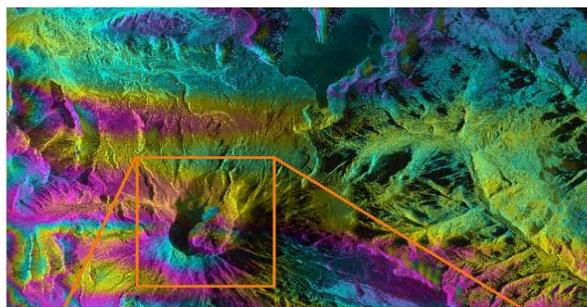
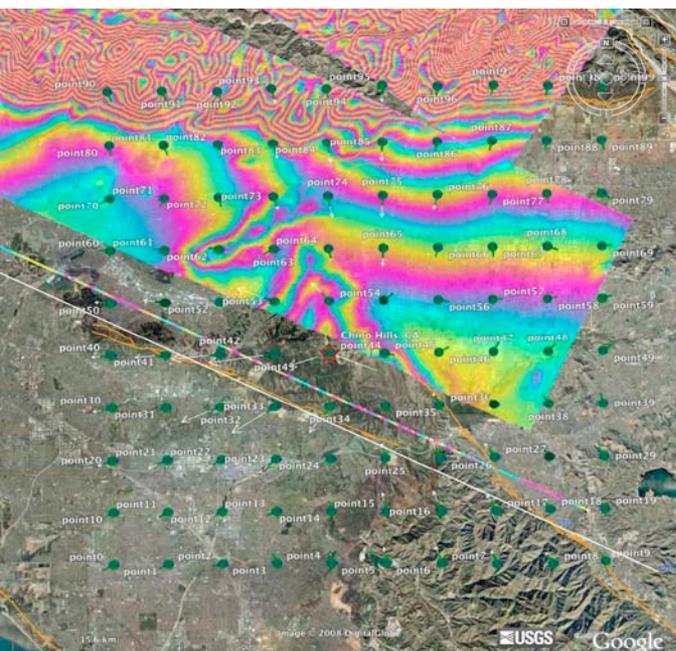


# UAVSAR Ground Swath July 23<sup>rd</sup> Earthquake



JPL

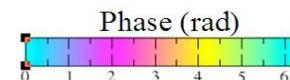
## Mt St Helens Interferogram - 4 hour Repeat



- This is a first cut interferogram
  - no offset measurements
  - no motion correction
  - no topography correction

- Since time between observations is 4.2 hours or .174 days, the estimated rate of motion for an approximate  $\pi$  radians of phase change is

$$\dot{\rho} = \frac{\lambda\phi}{4\pi\Delta t} = \frac{0.24}{4 \cdot 0.174} = 0.344 \frac{m}{day}$$





# Arctic Research of the Composition of the Troposphere from Aircraft and Satellites

## (ARCTAS)

A NASA contribution to IPY and the international POLARCAT initiative

<http://cloud1.arc.nasa.gov/arctas>



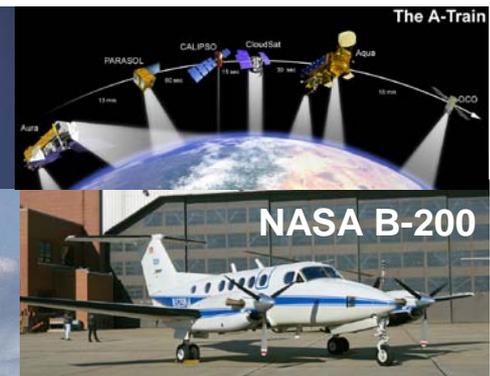
Conducted in spring and summer 2008 with the following foci:

1. **Long-range transport of pollution to the Arctic** (including arctic haze, tropospheric ozone, and persistent pollutants such as mercury)
2. **Boreal forest fires** (implications for atmospheric composition and climate)
3. **Aerosol radiative forcing** (from arctic haze, boreal fires, surface-deposited black carbon, and other perturbations)
4. **Chemical processes** (with focus on ozone, aerosols, mercury, and halogens)

April 2008: Fairbanks and Barrow, Alaska; Thule, Greenland

July 2008: Cold Lake, Alberta; Yellowknife, NW Territories

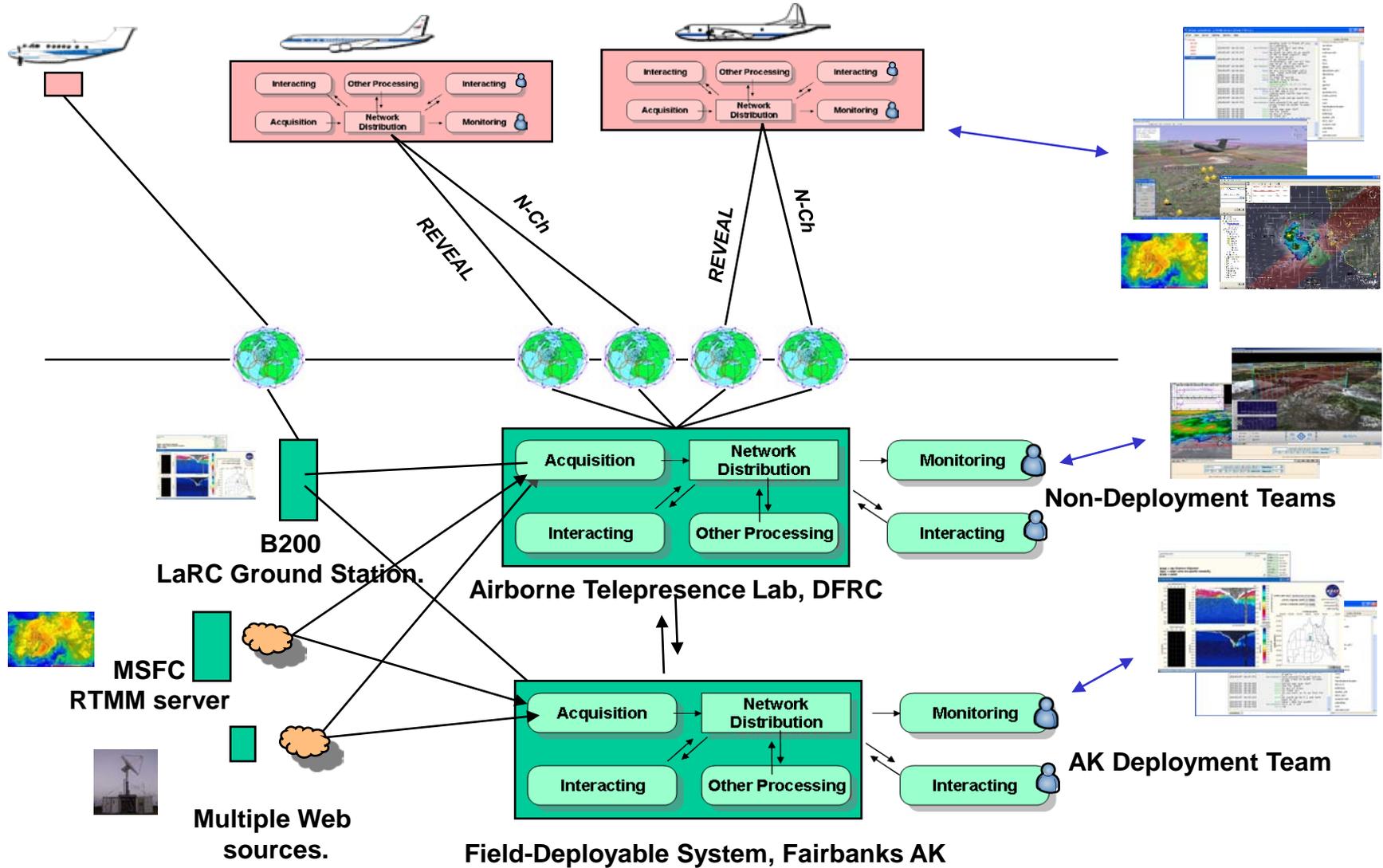
Partners: NASA, NOAA, DOE, NSF, Canada, France, Germany





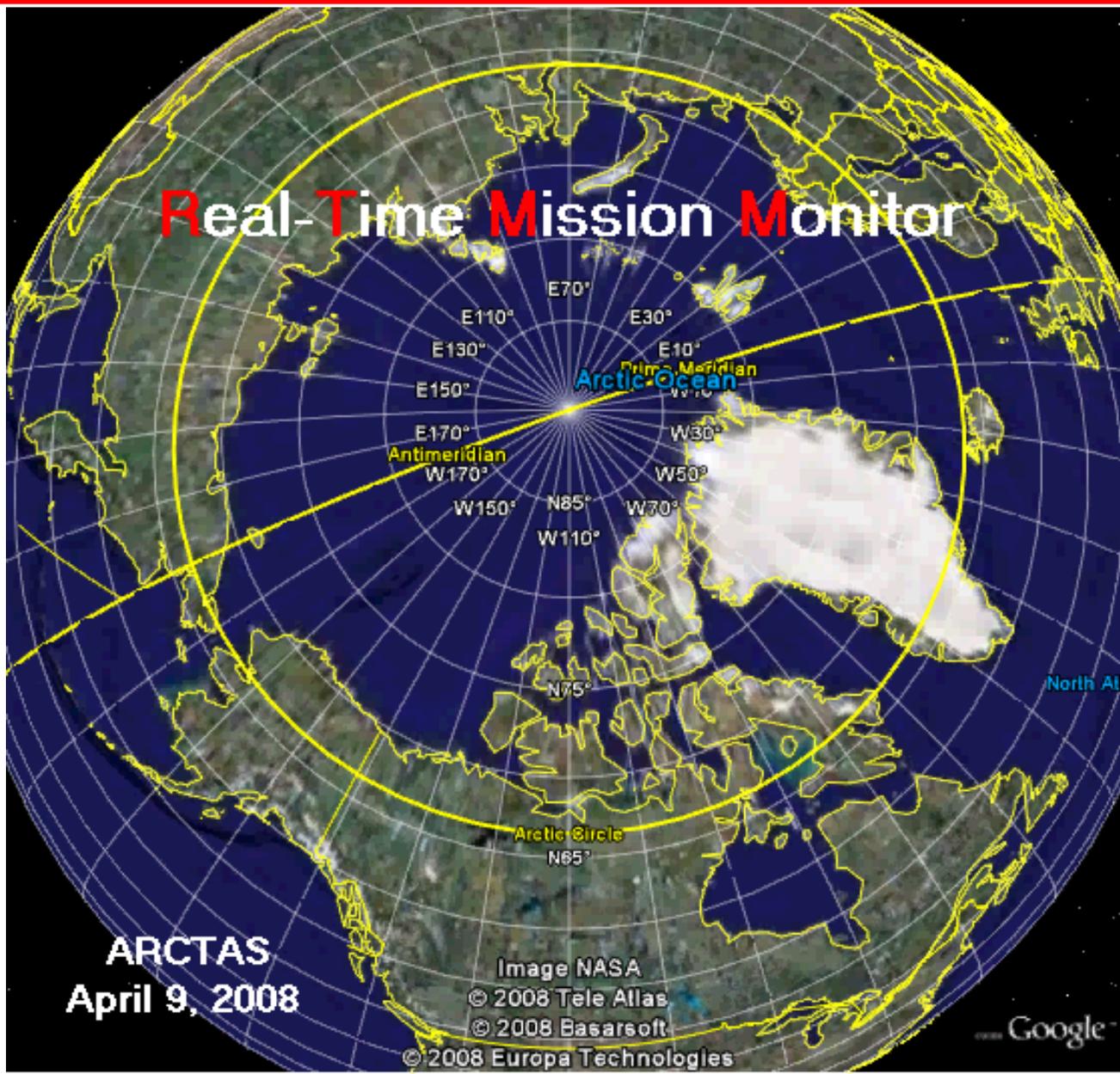
# ARCTAS Implementation

## Satcom/web mission interface



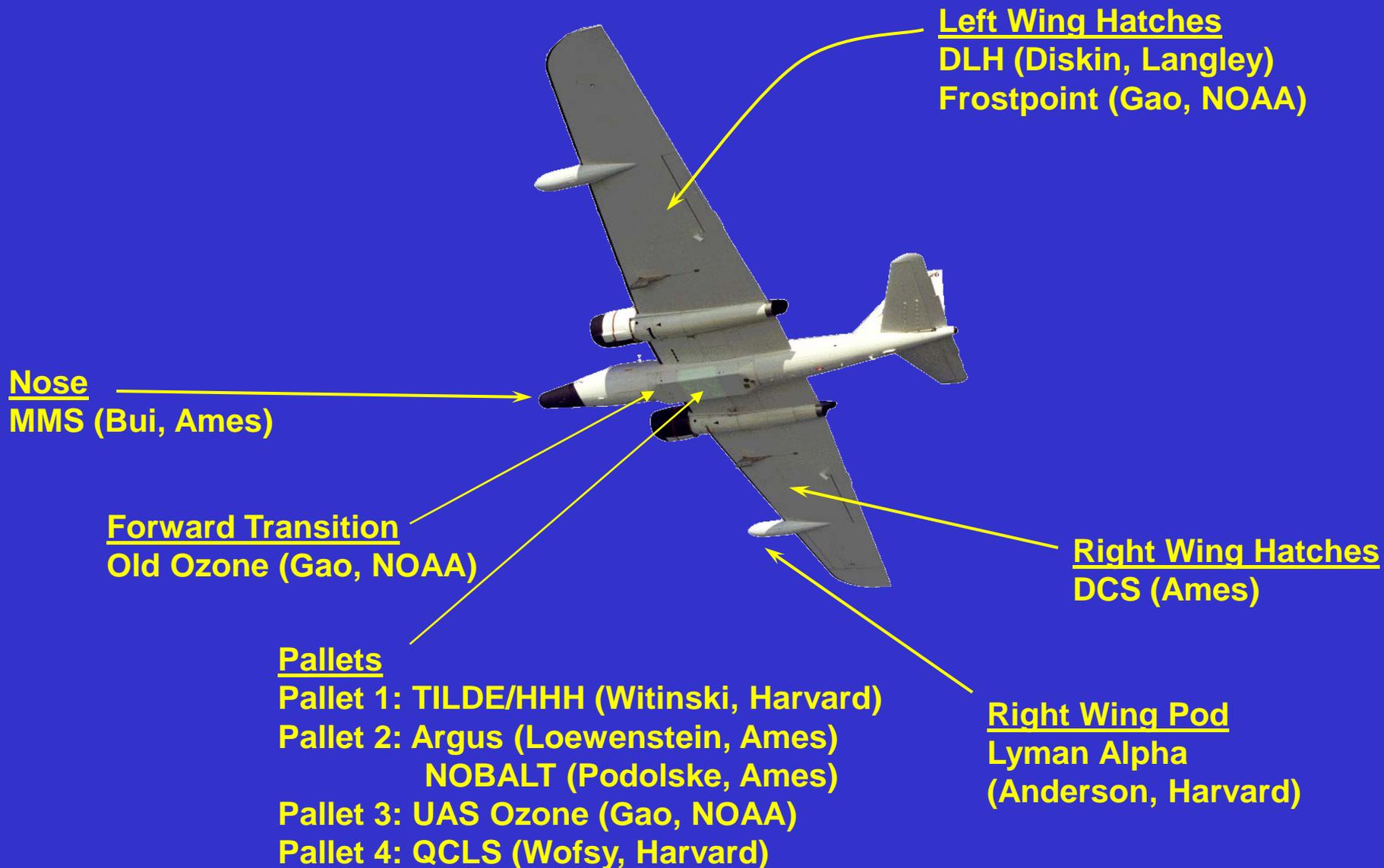


# ARCTAS MISSION





# NOVICE WB-57 Payload 2008





# Jules Vern / ATV European Space Agency Mission



**Mission: ATV**  
**Funding: ESA**  
**Dates: 25-30 Sept**  
**Location: Tahiti**  
**Aircraft: DC-8**

**Mission Joint with H211 G-V aircraft**

**GOODBYE, JULES VERNE:** On Sept. 29th, a 44,000-lb spacecraft plunged into Earth's atmosphere over the south Pacific Ocean, and this was the result: .... Scientists onboard a NASA DC-8 research plane photographed the reentry. They're studying how spacecraft and meteoroids break apart in Earth's atmosphere--and Jules Verne provided valuable data. Stay tuned for their findings. ..SpaceWeather.com

10/28/2008

Roberts

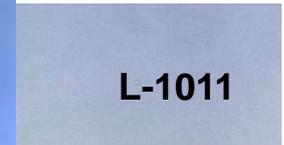




# Aircraft Catalog

## Blanket Purchase Agreements (BPA)

- Blanket Purchase Agreement respondents have come in. An unprecedented 12 companies offering dozens of aircraft are included:
  - Heavy Lift Aircraft**
    - L-1011
  - Medium Lift Aircraft**
    - B-200
    - G-1
    - Twin Otter
    - SAAB 340
    - OV-1
  - Light Aircraft**
    - Archer
  - Unmanned Aircraft**
- BPA award
- Paid for on a per mission basis. No recurring leases no contract minimum





# Platform Schedule



FY2009

	October	November	December	January	February	March
<b>WB-57</b>	CDC	Phase Maintenance			TWILITE HIWRAP	
<b>P-3</b>	SMAP	AESMIR		PALS/HighWinds		AIM
<b>DC-8</b>	B Check Inspection			AAPEX Grnd Test		
<b>ER-2</b>		TWILITE		AVIRIS	AVIRIS CoSSIR	AVIRIS AMS
<b>B-200</b>	MASTER (DOE)			HSRL/RSP(LARC)		
<b>UC-12</b>	ACCLAIM					
<b>G-III</b>	Pylon testflights	SMAPE	Ka-Band	Volcano	Local flights	
<b>Lear 25</b>	SIMPL testflights		Phase Maintenance	Solar Cell testflights		
<b>T.Otter</b>	AVIRIS & PALS					
<b>SIERRA</b>	IPY testflights	Cold weather tests		Cold weather tests	Yap USFS/ANG demo	
<b>Ikhana</b>	Acoustic tests	ARTS III				
<b>G.Hawk</b>						Testflights



Roberts

