
26
N926NA

2008 Activities

- New instrument development
  - ATOMMS
  - HIWRAP
  - TWILITE
  - NOVICE (Collection of new instruments)
- Ground and flight tests for superpod upgrade
- Shuttle entry boundary layer experiment (HYTHIRM)
- Private industry deployments
- DoD instrument development and deployments

Upgrades

- The superpod upgrade is the priority project for the coming 22 months
  - Requires gross weight increase
  - Facilitated by prior landing gear upgrade
  - Dependant upon adequate flutter margins for the new configuration(s). Preliminary analysis good
- Project Team established and began work in December 2007

Upgrade Schedule

- * Underway now
- * Fall 2008: Structural and flutter analysis complete.
- Provides verification of superpod compatibility
- * Jan – Jun 2009: Superpod fabrication and installation
- * Jul 2009: Flight tests
- * Oct-Nov 2009: Integrate superpod electrical and data during phase maintenance (Some integration in 2008 Phase?)
- * Dec 2009: TC4 Instrument integration
- * Jan 2010: Deploy
- * Note: Project includes two other elements; Landing gear analysis and performance analysis. The schedules for these elements are enveloped by structural and superpod schedules

Airborne Science Annual Review

Wallops Flight Facility
Presentation

Anthony R. Guillory
GSFC/WFF

NASA HQ
February 6, 2007

FY07 Catalog Aircraft

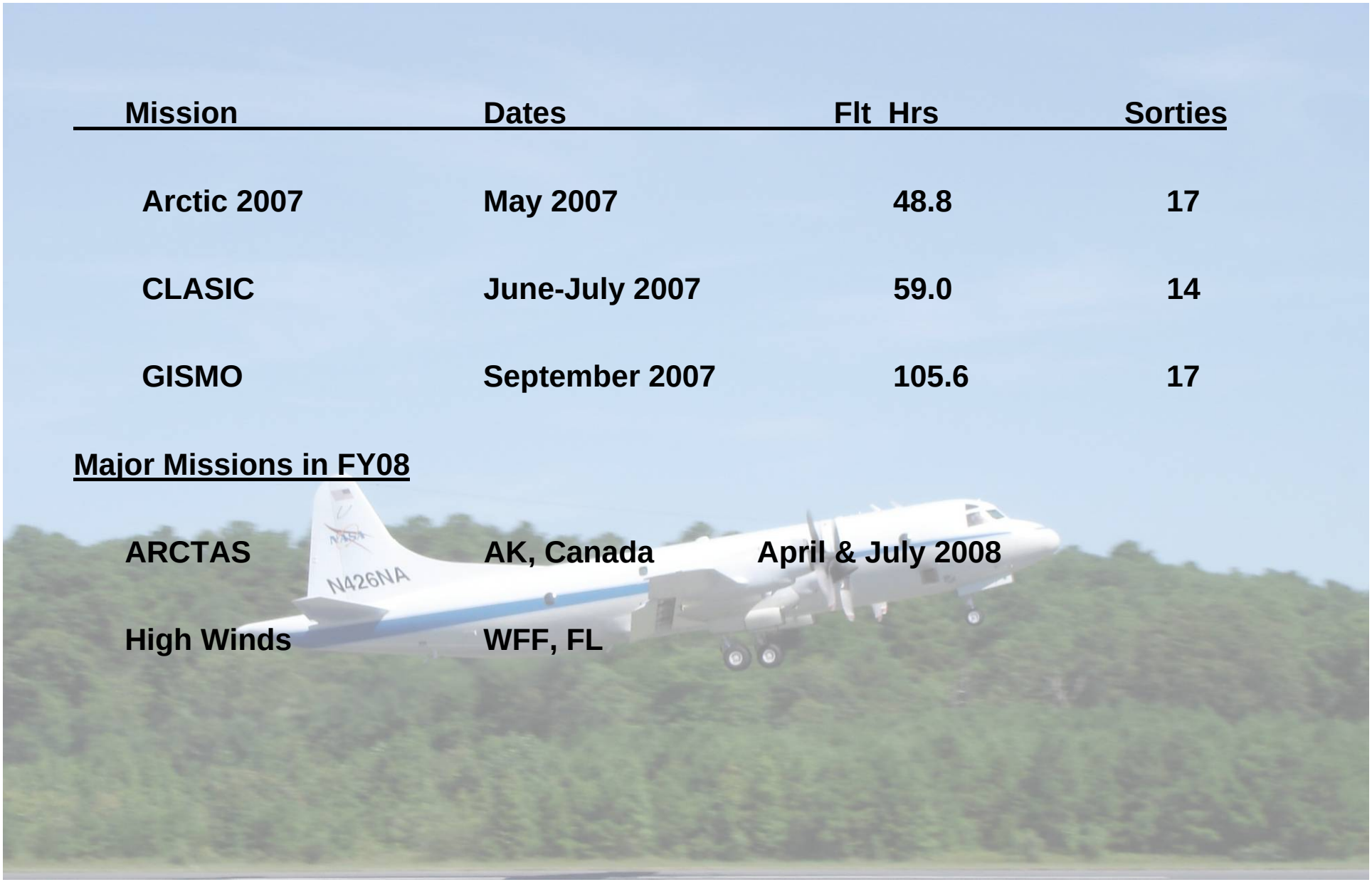
- **NASA**
  - P-3 (core)
  - LaRC B-200
  - GRC S-3
- **Commercial**
  - Twin Otter
  - J-31
  - Caravan
  - A-200
- **Other Government**
  - DOE B-200
  - NRL P-3

P-3 Accomplishments FY07

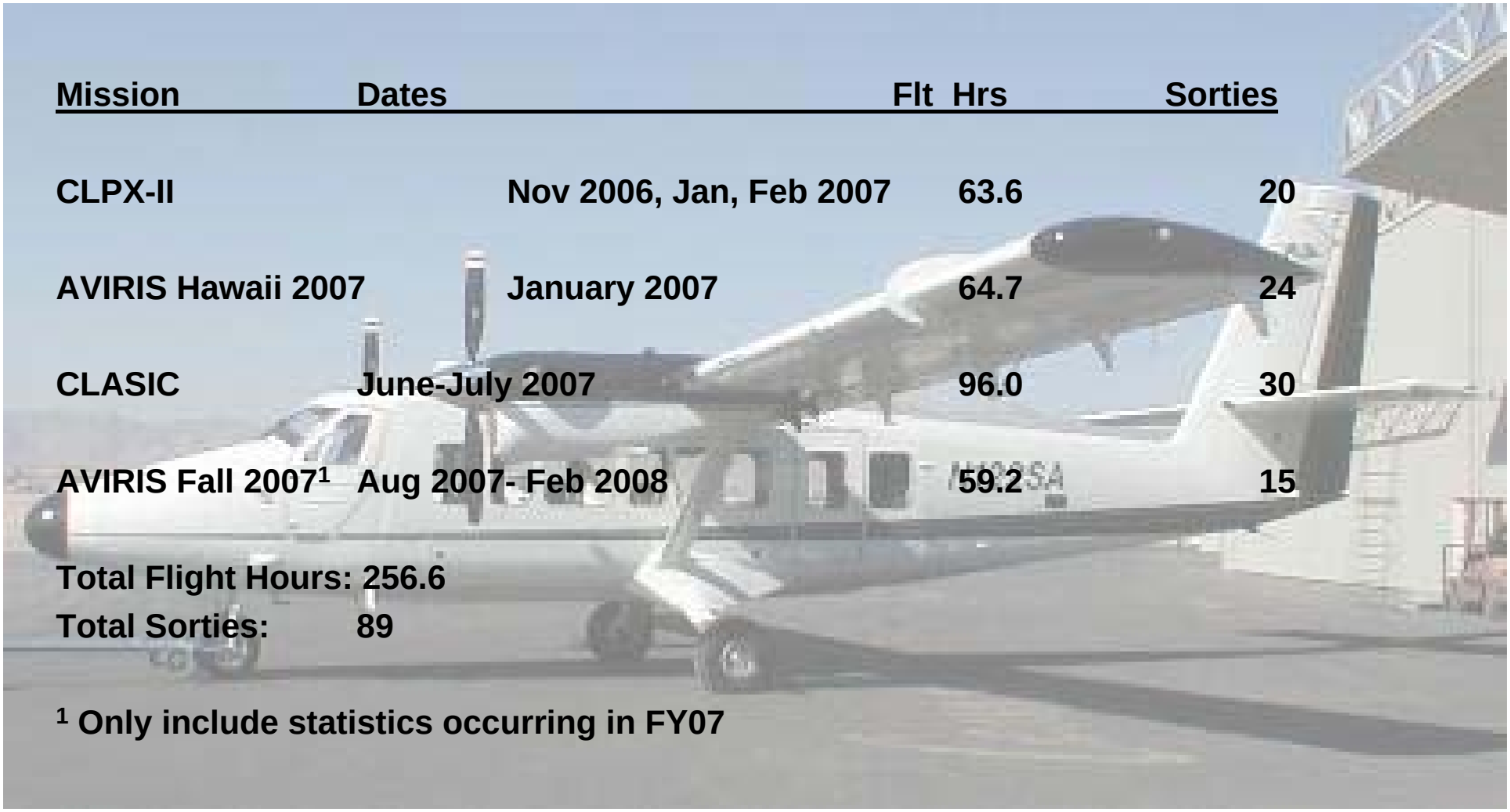
Mission	Dates	Flt Hrs	Sorties
Arctic 2007	May 2007	48.8	17
CLASIC	June-July 2007	59.0	14
GISMO	September 2007	105.6	17

Major Missions in FY08

ARCTAS	AK, Canada	April & July 2008
High Winds	WFF, FL	



Twin Otter in FY07



Mission	Dates	Flt Hrs	Sorties
CLPX-II	Nov 2006, Jan, Feb 2007	63.6	20
AVIRIS Hawaii 2007	January 2007	64.7	24
CLASIC	June-July 2007	96.0	30
AVIRIS Fall 2007[1]	Aug 2007- Feb 2008	59.2	15

Total Flight Hours: 256.6
Total Sorties: 89

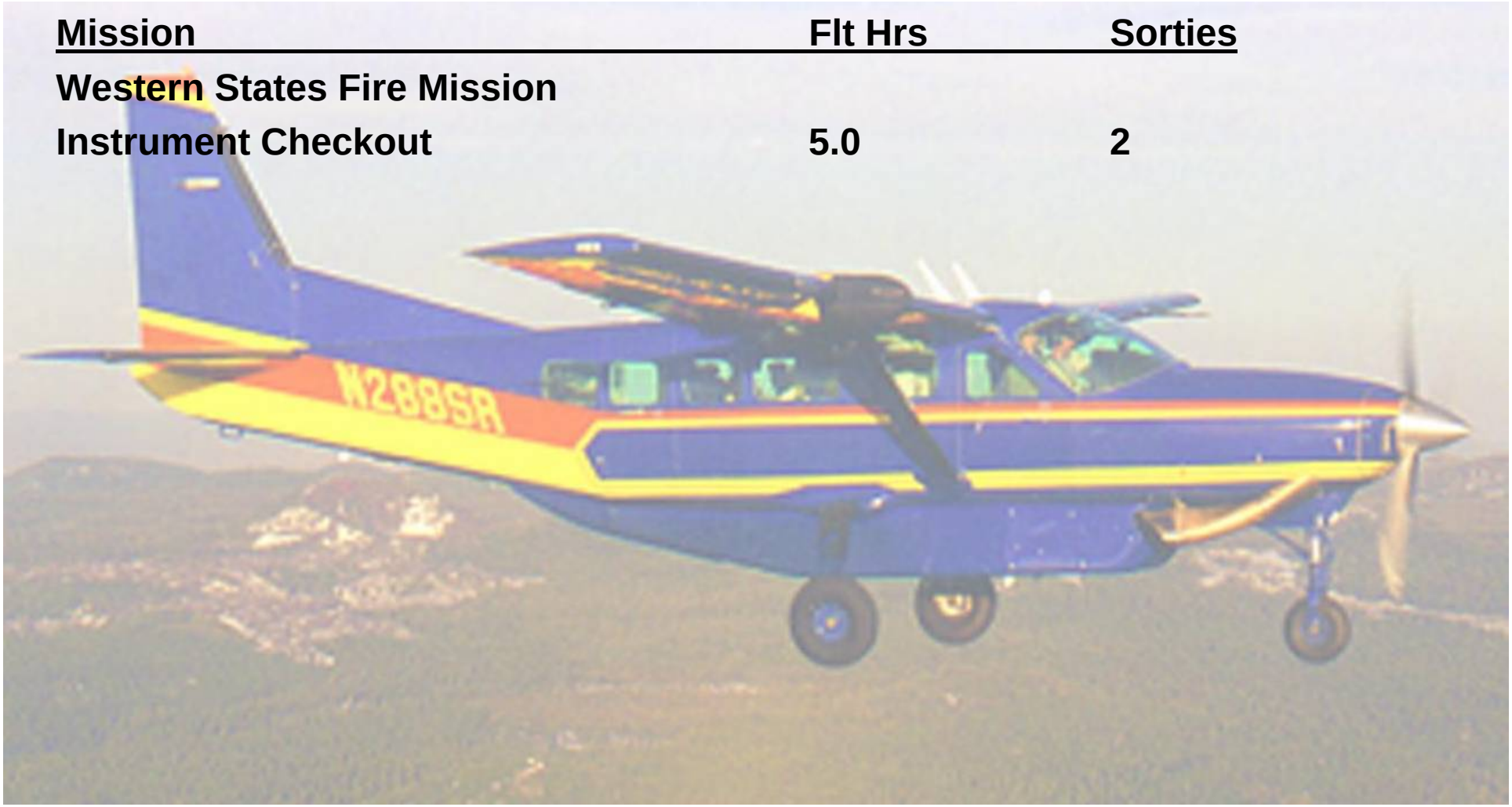
[1] Only include statistics occurring in FY07

Twin Otter in FY08

Mission	Dates
CLPX-II	November 2007, Feb/Mar 2008
AVIRIS	Spring or Fall possibly

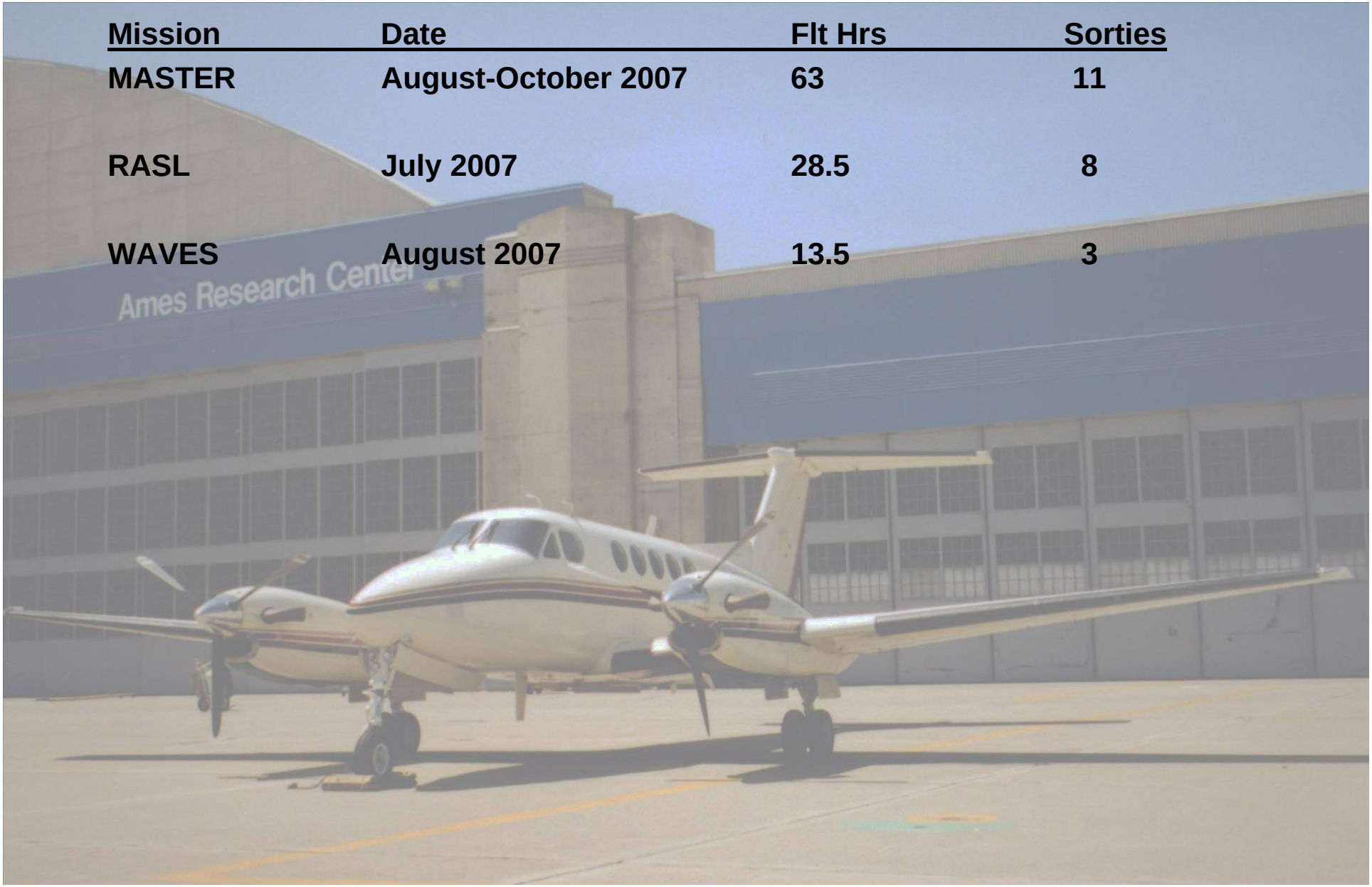
Sky Research Caravan

Mission	Flt Hrs	Sorties
Western States Fire Mission		
Instrument Checkout	5.0	2



DOE B-200 / Dynamic Aviation A-200

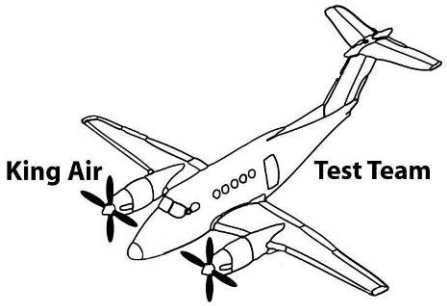
Mission	Date	Flt Hrs	Sorties
MASTER	August-October 2007	63	11
RASL	July 2007	28.5	8
WAVES	August 2007	13.5	3



LaRC B-200

Research Activity

Flight Statistics

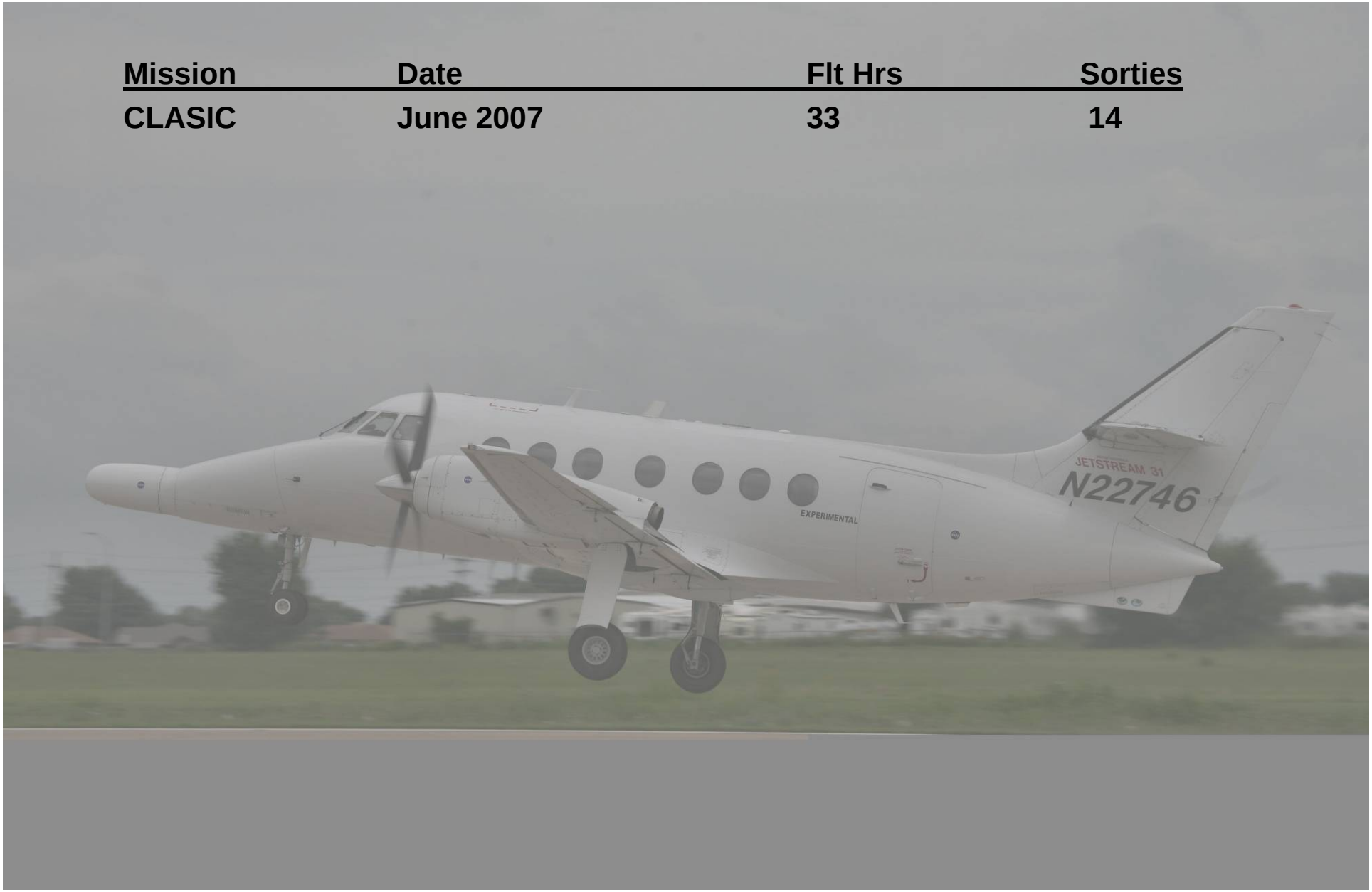


Breakdown by Deployment/Event	Research Flight hours	Research Sorties
CALIPSO Validation - US East Coast	4.1	2
San Joaquin Valley EPA	45	16
CALIPSO Validation - US East Coast	6.6	3
CHAPS/CL w/CALIPSO	71	22
CALIPSO Validation - US East Coast	40.7	12

Total: 177.5 hours, 57 sorties

J-31

Mission	Date	Flt Hrs	Sorties
CLASIC	June 2007	33	14



Aerosonde in FY07

- NASA/NOAA Hurricane Demonstration 2007
  - Based out of Key West, FL with secondary base at WFF
  - FAA granted COA in late 2006 for flights out of Key West
  - Hurricanes did not cooperate for flights out of Key West
  - Flew 17.5 hour mission, flying at 300-500 feet, into Hurricane Noel on November 2nd (FY08) out of WFF

Blanket Purchase Agreements

- RFQ for BPA was released in February 2007
- No contract minimum
- $750K per Delivery Order Cap, $10M per BPA Cap
- Solicited Platform Categories:
  - Manned: Light
  - Manned: Medium
  - Manned: Heavy
  - UASs
  - Lighter-than-Air
- 13 vendors responded
  - Responses in all categories, except Lighter-than-Air
- 10 vendors were awarded BPAs yesterday!!
- Tasked on a Mission by Mission Basis

Aircraft Catalog
Blanket Purchase Agreement Vendors

Vendor	Aircraft	Category
Airtec	B-200	Medium
	Beechcraft Baron	Medium
Battele	Gulfstream 1	Medium
Dynamic Aviation	Beechcraft A-100	Medium
	Beechcraft A-200	Medium
	Beechcraft A-90	Medium
Foldesi & Associates	Learjet 24	Medium
	SAAB 340	Medium
L-3/BAI	Viking 100	UAS
	Viking 300	UAS
	Viking 400	UAS
Mohawk Technologies	OV-1	Medium
Orbital Sciences	L-1011	Heavy
Thesis	Super Ferret	UAS
	Tarzan TD-1c	UAS
Twin Otter International	Twin Otter	Medium
University Research Foundation	Cessna 402B	Light
	Piper Arrow	Light
	Piper Aztec	Light

Summary

Aircraft Utilized in FY07

- **NASA**
  - P-3
  - LaRC B-200
- **Commercial**
  - Twin Otter
  - J-31
  - Caravan
  - A-200
  - Aerosonde
- **Other Government**
  - DOE B-200

BPA Awarded

Provides access to 10 commercial companies with over 19 different types of aircraft.

Approximate Mission Directorate funding for NASA Aircraft

- **Space Operations Mission Directorate (~$75M)**
- **Science Mission Directorate (> $1B capital investment)**
  - **(Earth Science ~ $30M)**
  - **(Astrophysics ~ $40M)**
- **Aeronautics Research Mission Directorate (~$15M)**

******After Shuttle retirement SMD will manage the bulk of the aviation budget within the agency**

Not Validated with MDs, these are ROM values from PA&E

Internal & External Program Drivers

- NASA Science Plan
- National Research Council Decadal Survey
- NASA Advisory Committee, Earth Science Subcommittee
- Global Earth Observation System of Systems
- Climate Change Science Program
- Ocean Action Plan

NOBEL Laureates with Airborne Science connections: Sherry Rowland, Mario Molina, Paul Crutzen, George Smoot, John Mather & IPCC

ASP Requirements Report

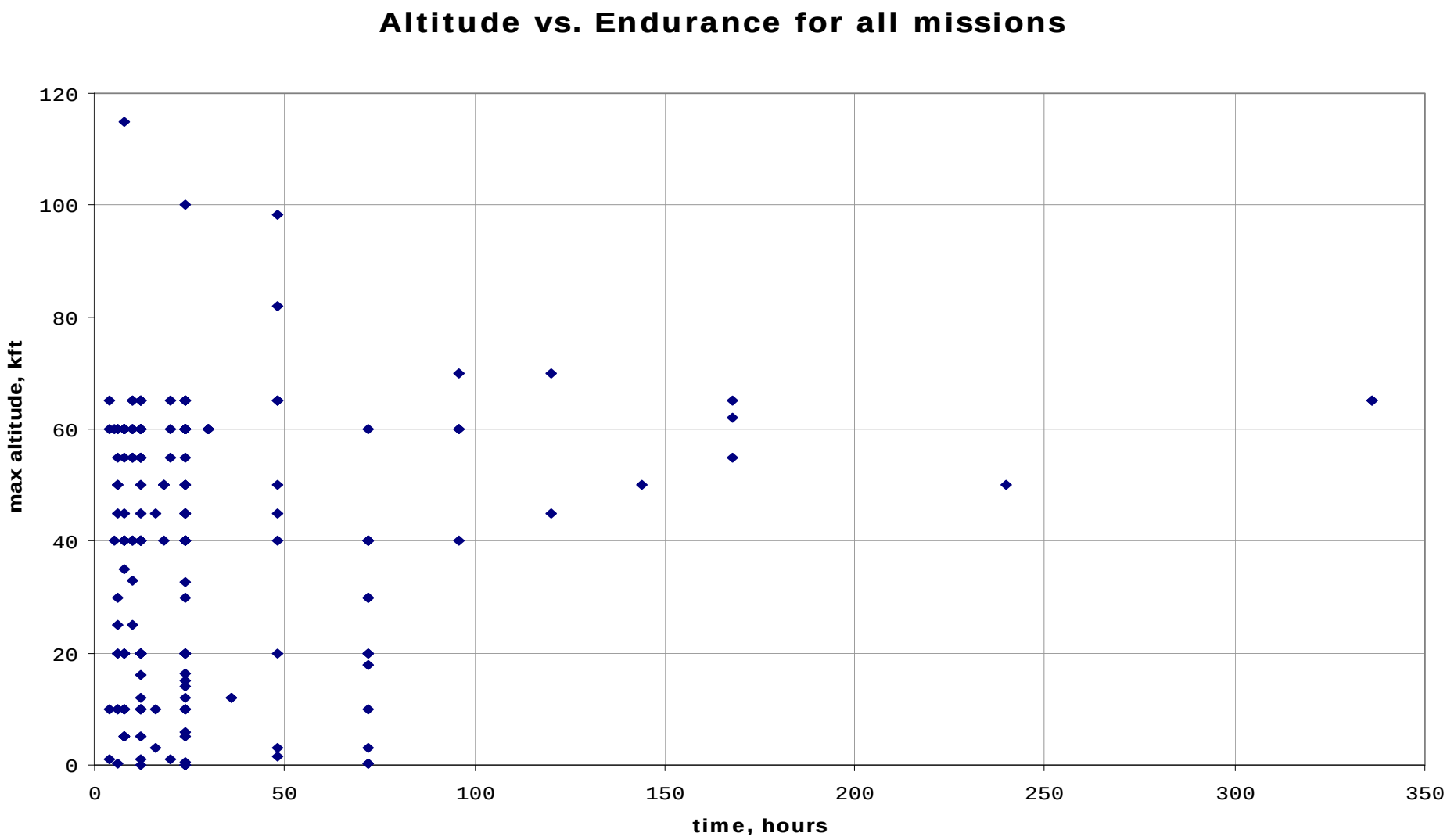
- Science Requirement → Measurements → Platforms
- Six R&A Focus Areas
  - Atmospheric Composition
  - Carbon Cycle and Ecosystems
  - Climate Variability and Change
  - Earth Surface and Interior
  - Water and Energy Cycle
  - Weather

Example of Focus Area Suborbital Support Summary

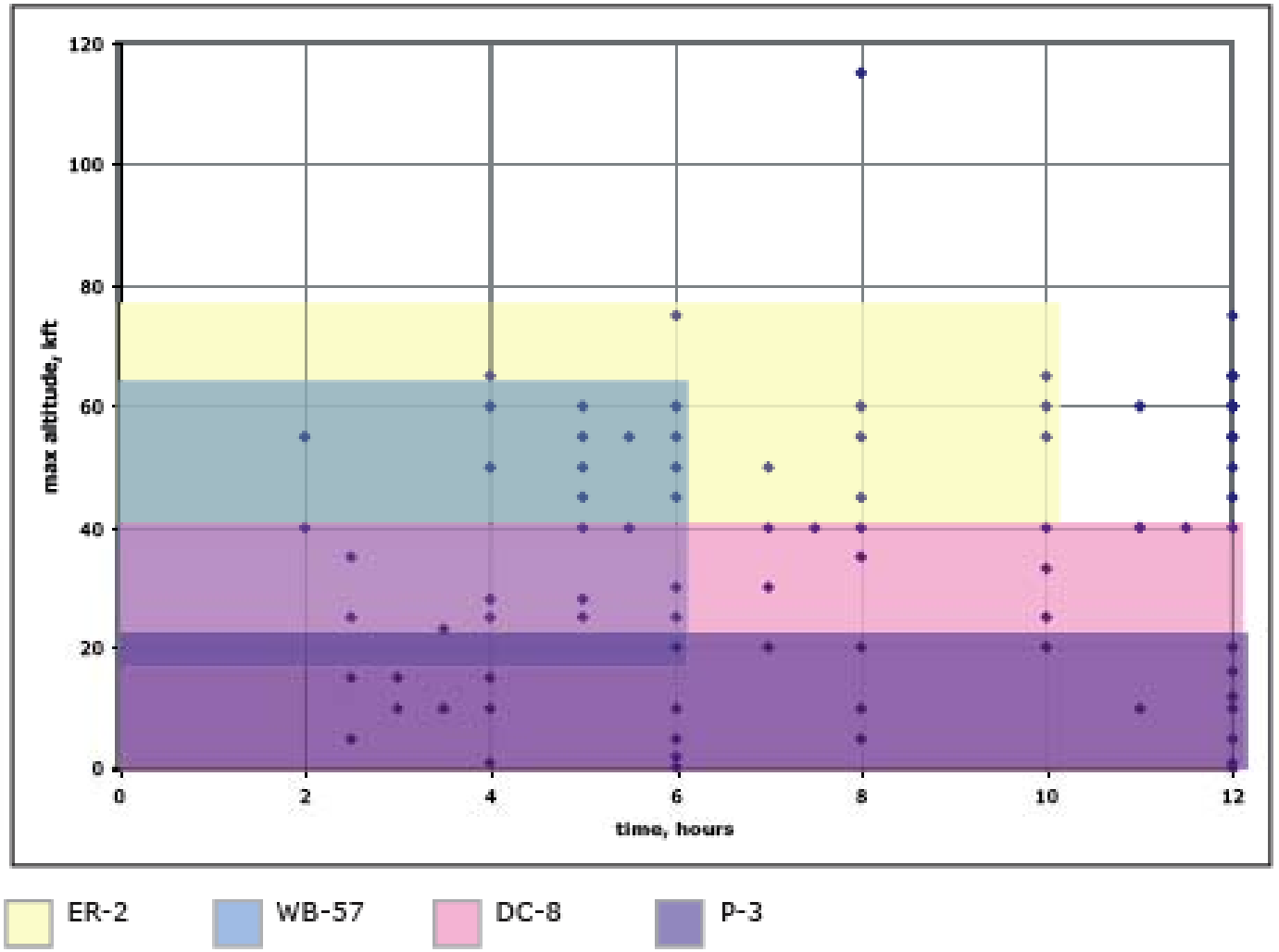
Type	Timeframe	Suborbital Program support/remarks
Satellite Cal/Val missions		
AURA	2006-2008	Pre- and post-launch Cal/val
OCO	2008–2010	Cal/val
GLORY	2009-2010	Cal/val
AQUARIUS	2009-2010	Cal/val
NPOESS	2011	Cal/val
Calipso/Cloudsat	2006 +	Cal/val
New Airborne Sensor development		
IIP – HSRL	2006-7	Calipso validation
IIP – Harvard water	2006-7	
Laser sounder for CO2	2007-8	Global measurement demo
GOLD	2006	Airborne Ozone Lidar
HSRL and DIAL Lidar	2008	Ozone
Airborne Process studies		
TC-4	2007 (Costa Rica); 2010 (Guam)	Validates A-Train, plus process studies: trace species;
ARCTAS / POLARCAT	2008 (Arctic)	Pollution chemistry in the Arctic
Global Hawk / decadal survey proposal	2009	Stratospheric chemistry

Table 2.3 Summary of upcoming Atmospheric Composition and Chemistry missions

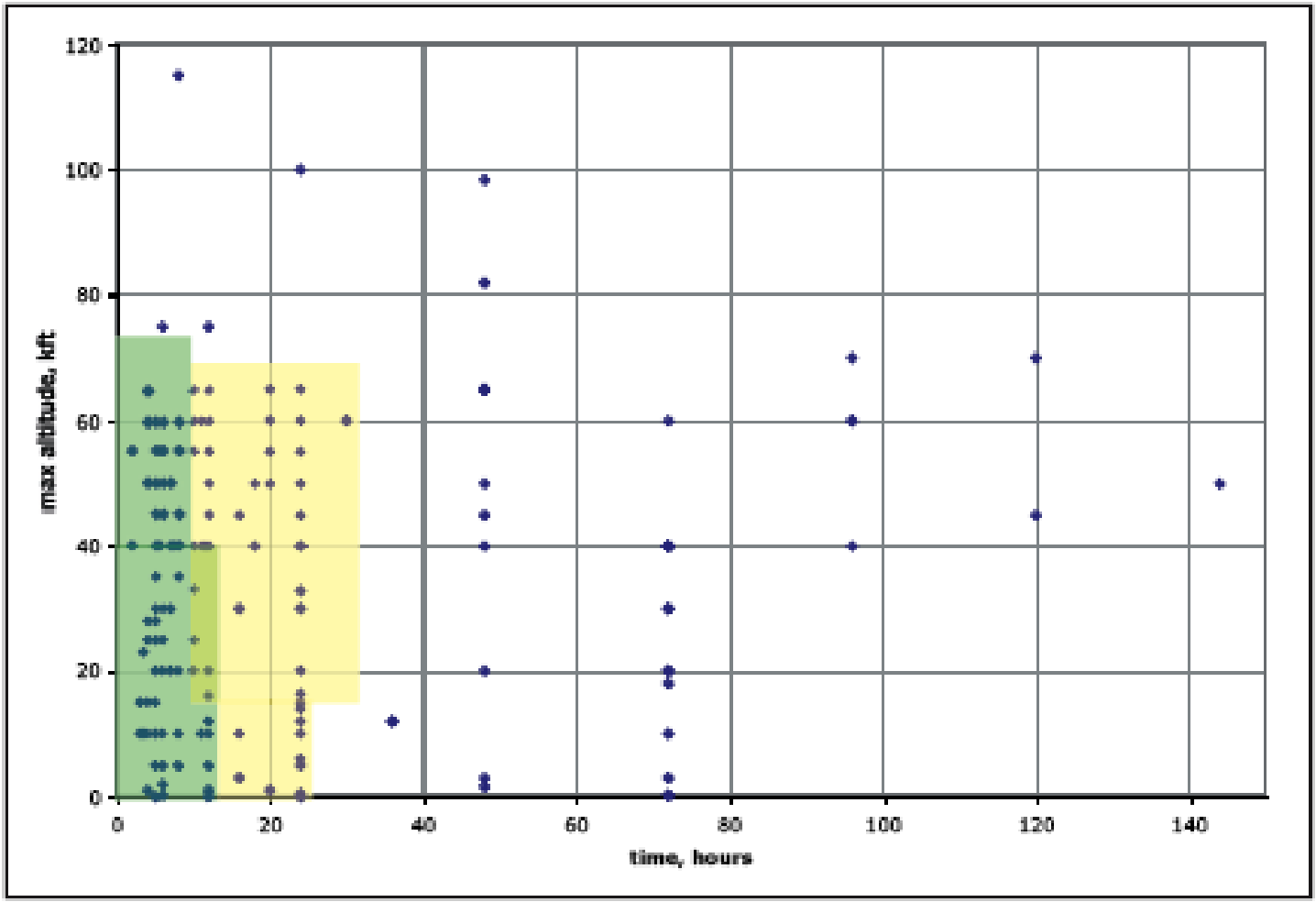
Required Science Measurement Objectives



Core Aircraft Support of Required Measurements



Core and New Technology Aircraft Support of Required Measurements



Strategic Planning

- Engineering schedule and timeliness of development activity
  - 7 more FTE Engineers (As an ASP contribution to support Science integration) ~ 1.5M/yr
- UAS Airspace Access 1 FTE at FAA NASA detail
- Strategic Aircraft upgrade investments –
  - WB-57 Autopilot and Engines - $10M multiple years FY 10-14
    - Extended fuel capability and Ejection Seats
  - P-3 Autopilot and major inspection $3M over 09/10
  - Fuel heat system – ER-2, WB-57, Global Hawk ~$1M
- High data rate SATCOM system, portable to multiple aircraft $1M,
  - 2 units, + 1 WYE
- Long term DC-8 replacement - $70 - $150M????? FY 2015-2025

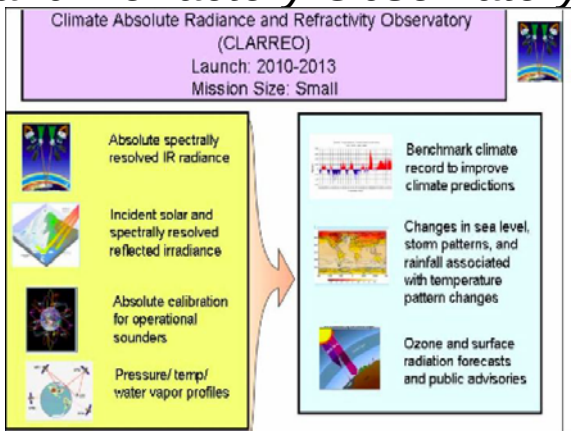
NRC Decadal Survey for Earth Science: (released 16 January 2007)

Space-based observations provide a global view of many Earth system processes; however, satellite observations have a number of limitations, including spatial and temporal resolution and the inability to observe certain parts of the Earth. Hence, they do not provide a picture of the Earth system that is sufficient for understanding key physical, chemical, and biological processes.

Recommendation: NASA should support Earth science research via suborbital platforms: *airborne programs*, which have suffered substantial diminution, should be restored, and *UAV technology* should be increasingly factored into the nation's strategic plan for Earth sciences.

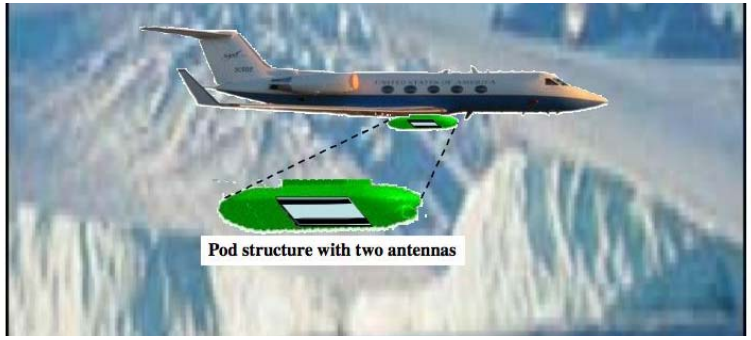
Decadal Survey Risk Reduction (2010-2013)

CLARREO *(Climate Absolute Radiance and Refractory Observatory)*

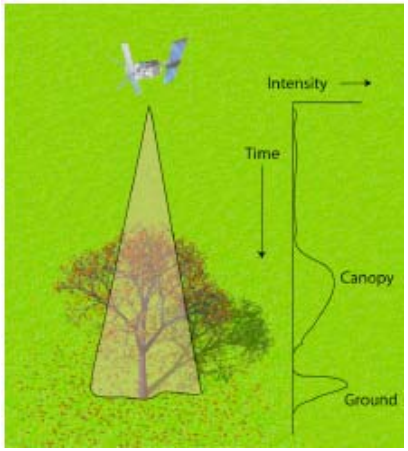


SMAP *(Soil Moisture Active-Passive)*

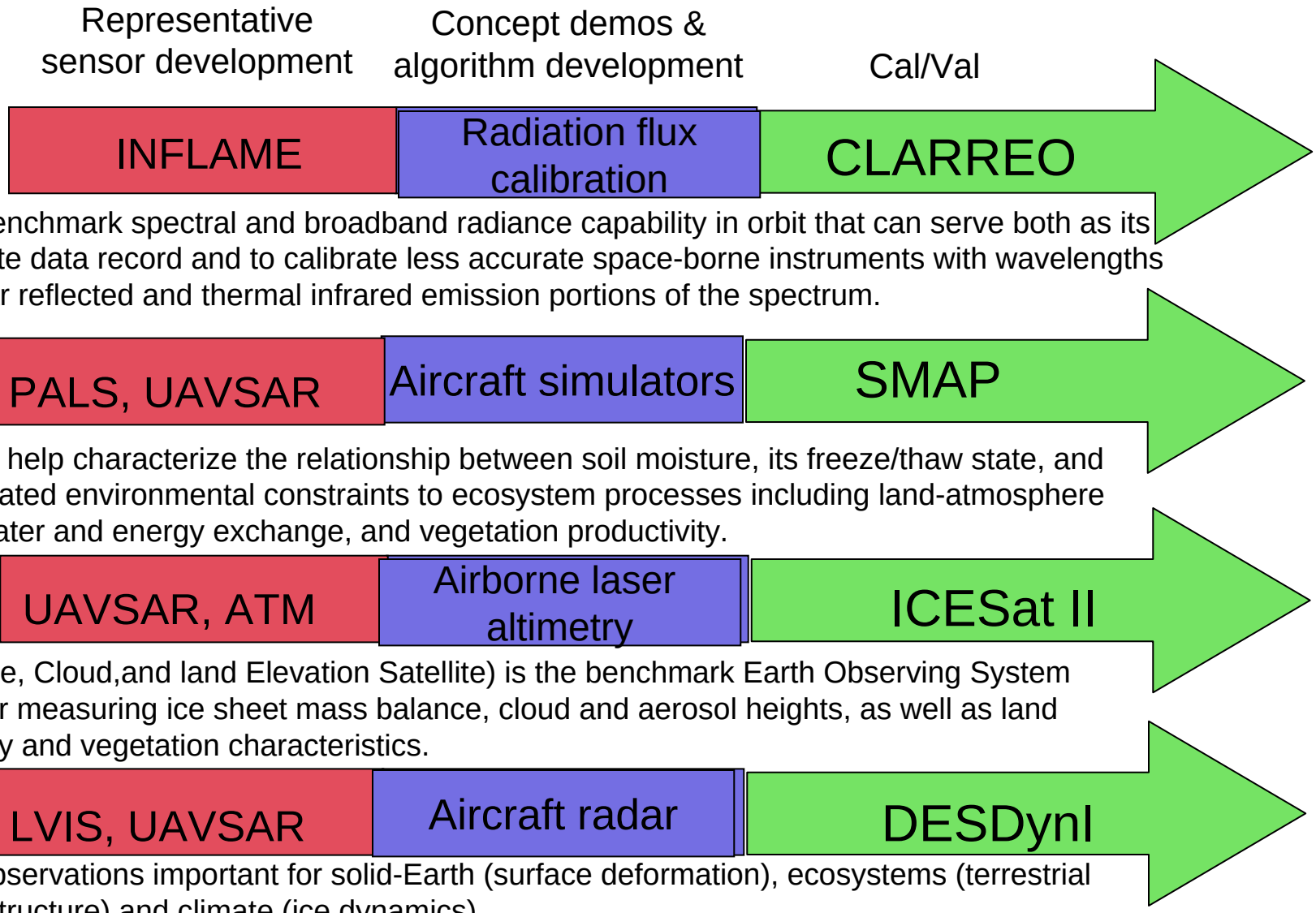
ICESat II



DESDynI *(Deformation, Ecosystem Structure and Dynamics of Ice)*



ASP Support for Near-Term Decadal Survey Missions (2008-2012)



Airborne Science Program

- Requirements understood
  - Refocused program direction
- NASA unique strengths
    - high-altitude platforms
    - highly reconfigurable heavy-lift flying laboratories
    - Large, diverse catalog
- Critical to Earth science future
  - Decadal missions
  - Global Climate Change Missions
- Great value
  - Highly capable, motivated people
  - Unique suite of full service capabilities

Low Cost Low Altitude hovering Airborne UAS