

A composite space image featuring Earth in the top left, the Sun in the center, the Moon, Mars, and Jupiter in the lower half, a comet streaking across the upper right, and a galaxy in the top right corner.

**Science Mission
Directorate**

Hurricane Science Team Meeting

**Ramesh Kakar
April 6, 2009**



- Welcome to the First Hurricane Science Team Meeting
- Congratulations to the P.I. s that were selected
- We are, of course, interested in analyzing the NASA satellite and field experiment data, and analyzing data obtained in cooperation with other federal agencies
- The primary focus of this first meeting, however, is going to be to design a field experiment for the 2010 hurricane season in cooperation with other participating federal agencies.
- Contingency plan in case the Global Hawk cannot go over the hurricanes





NASA Research Announcement

Science Mission Directorate
NASA Research Announcement
Hurricane Field Experiment
Solicitation: NNH09ZDA001N

Dates Release February 13, 2009

NOIs Due March 16, 2009

Proposals Due May 14, 2009

Funds likely to be available: \$1.5 M/year for 3 years

Number of Awards: 8-10 out of 15-20 proposals

The HSRP Science Team (20 members) was selected via ROSES-2008

This solicitation is for the selection of instruments to be deployed on NASA-DC8 and NASA-GH for participation in a Hurricane Field Experiment in 2010 and subsequent data analysis



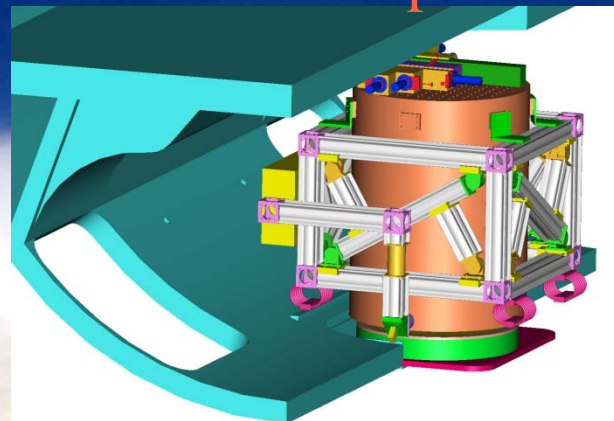


NASA Hurricane Research Focus Areas

Satellite remote sensing



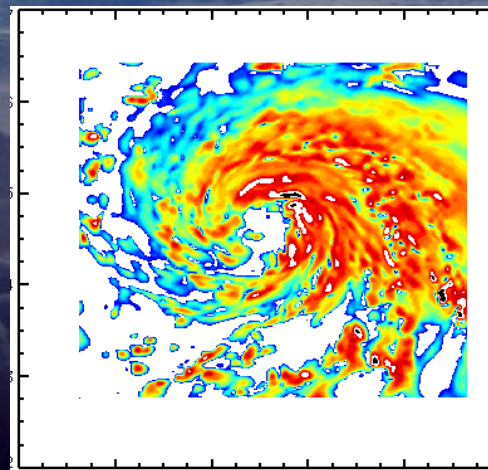
Sensor development



Field campaigns



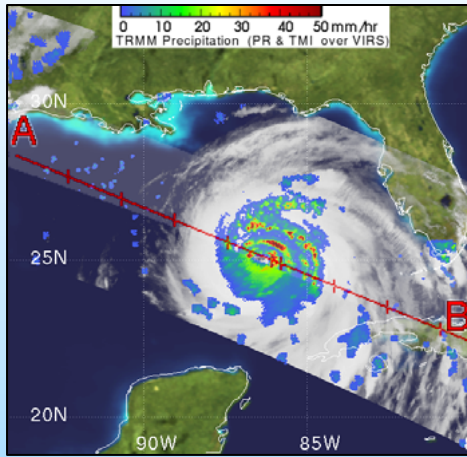
Numerical modeling



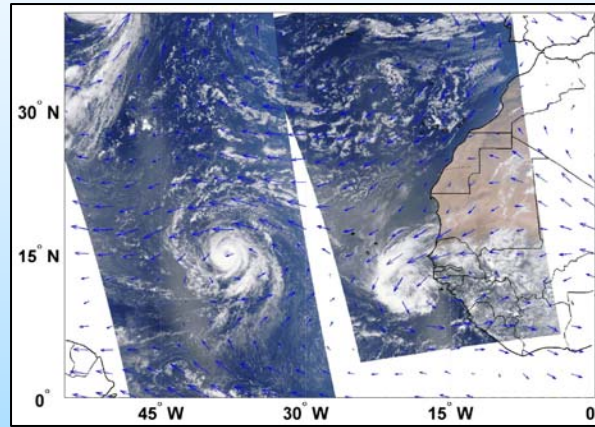


Some of the Satellites Impacting Hurricane Research

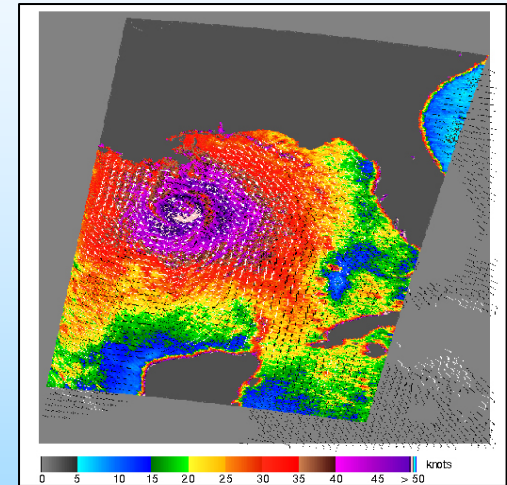
TRMM



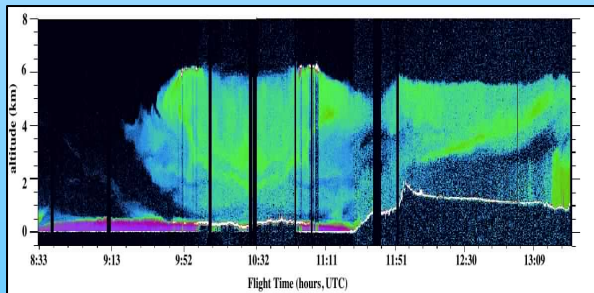
Aqua



Quikscat



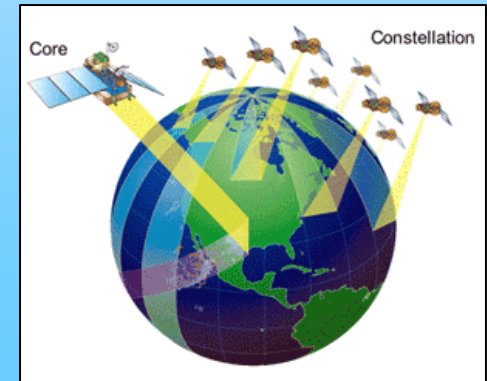
CALIPSO/CloudSat



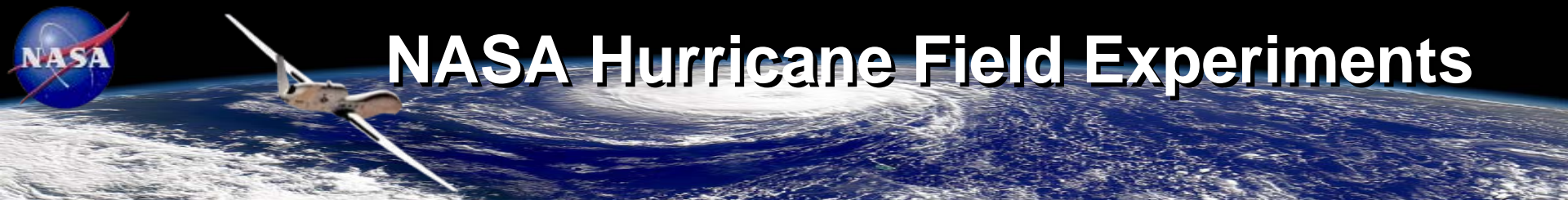
OSTM



GPM



March 4, 2008

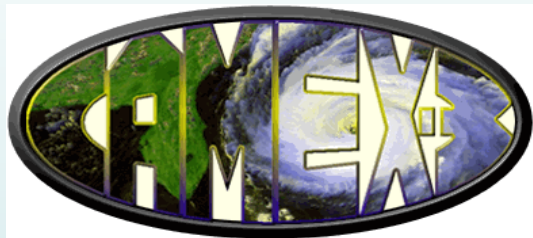


NASA Hurricane Field Experiments

Program Manager: Ramesh Kakar

Field programs coordinated with NOAA/Hurricane Research Division

1998



2001



2005



2006



2010 (GRIP logo tbd)

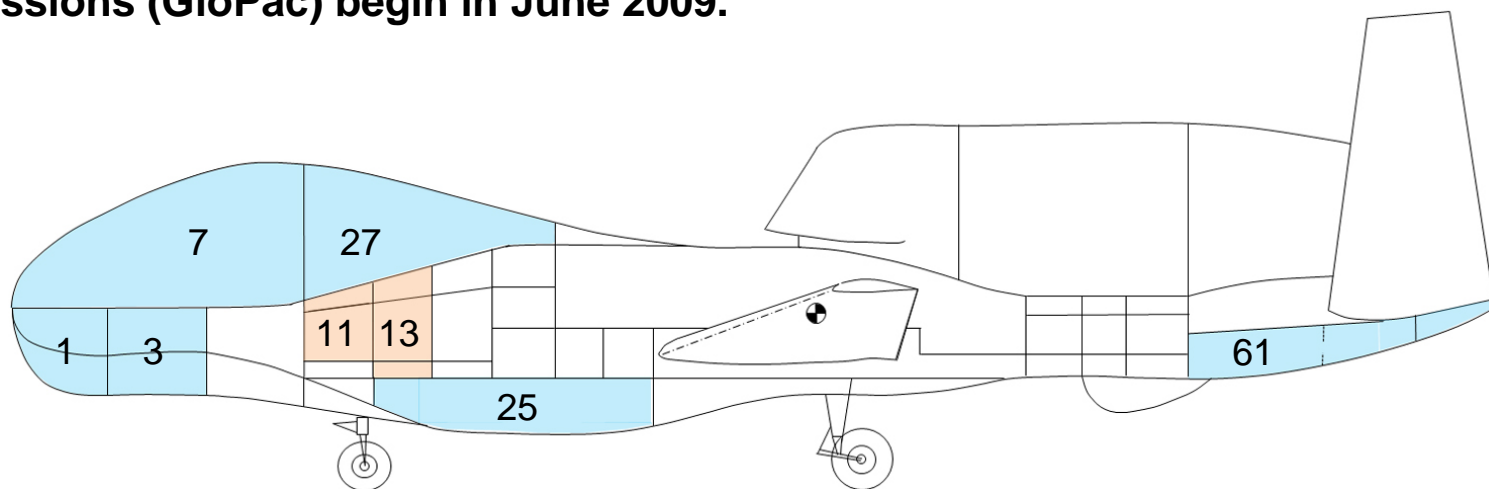


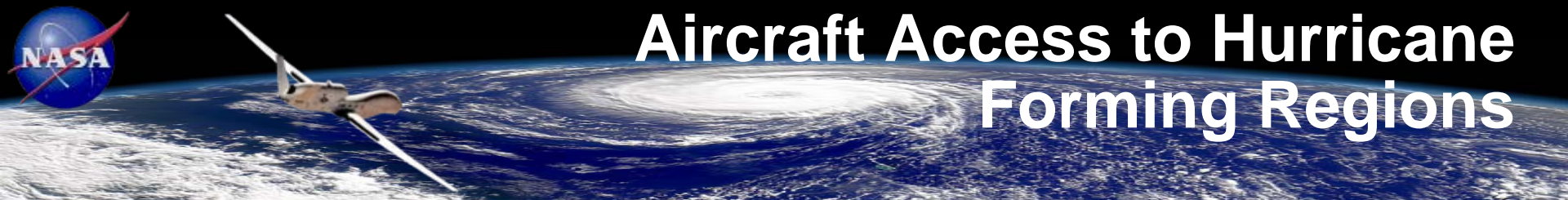


NASA Global Hawk Overview

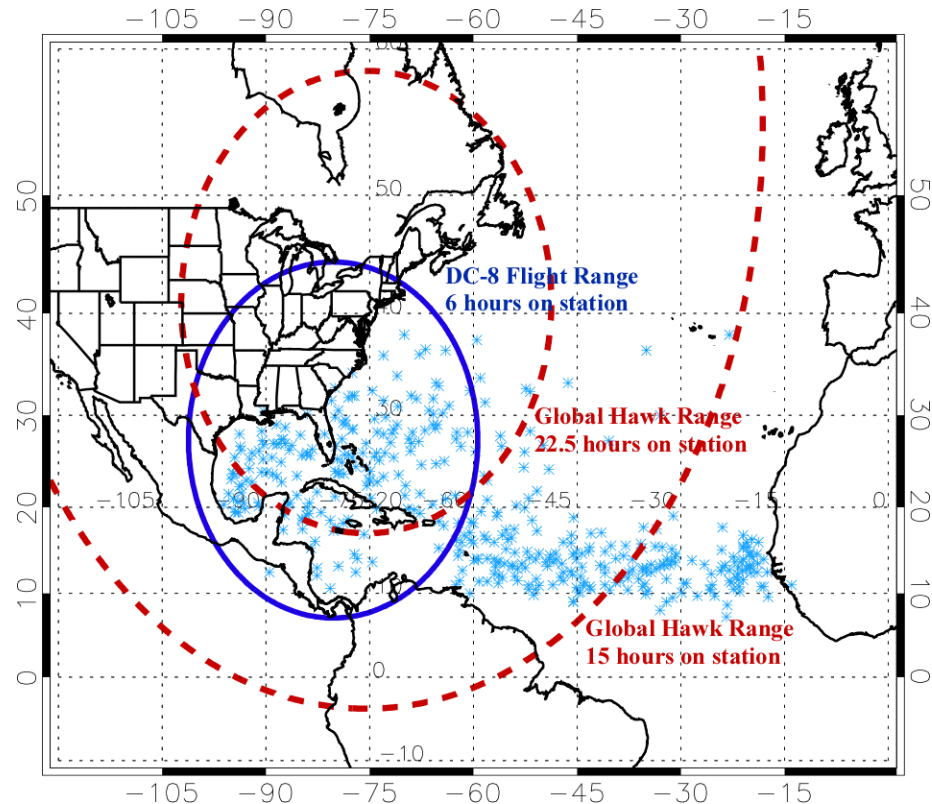
- Two USAF Pre-Production Global Hawk aircraft were transferred to NASA in September 2007.
- The aircraft are based and operated from Dryden Flight Research Center on Edwards Air Force Base.
- A combined NASA/Northrop Grumman team is maintaining, modifying, and operating the UAS.
- Flight Operations begin in March 2009.
Science Missions (GloPac) begin in June 2009.

Wingspan	116 feet
Nominal Range	>11,000 nmi
Endurance	>31.5 hours
Max. Cruise Altitude	65,000 feet
Gross Weight	26,750 lbs
Fuel Capacity	15,300 lbs
True Airspeed	335 knots
Payload Weight	2000 lbs
Payload Power	10 kVA
Payload Volume	>175 ft ³





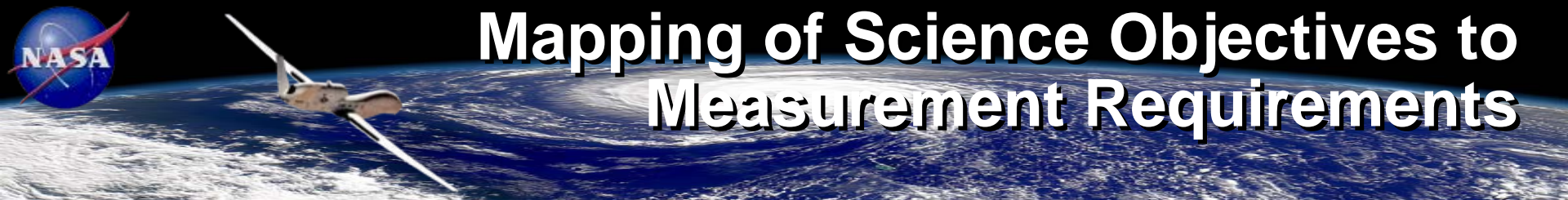
- The Global Hawk adds considerable surveillance capability
- Greater range and duration than DC-8 or ER-2
- Allows for extended on-station time in hurricane genesis regions
- Geosynchronous simulator



Blue line: DC-8 range for 12-h flight, 6 h on station

Red lines: GH range for 30-h flight with 15 and 22.5 h on station

Light blue X: Genesis locations for 1940-2006



Mapping of Science Objectives to Measurement Requirements

Science Objectives

Can we predict track, intensity, structure, surge and rainfall of landfalling tropical cyclones?

Do we understand hurricane genesis and development?

Do we understand the rapid intensity changes?

What is the role of the SAL?

Do we understand the extratropical transition?

Measurement Requirements

3-d wind structure

2-d, 3-d precipitation structure

Tropospheric wind profiles

Surface wind measurements

Temperature profiles

Humidity profiles

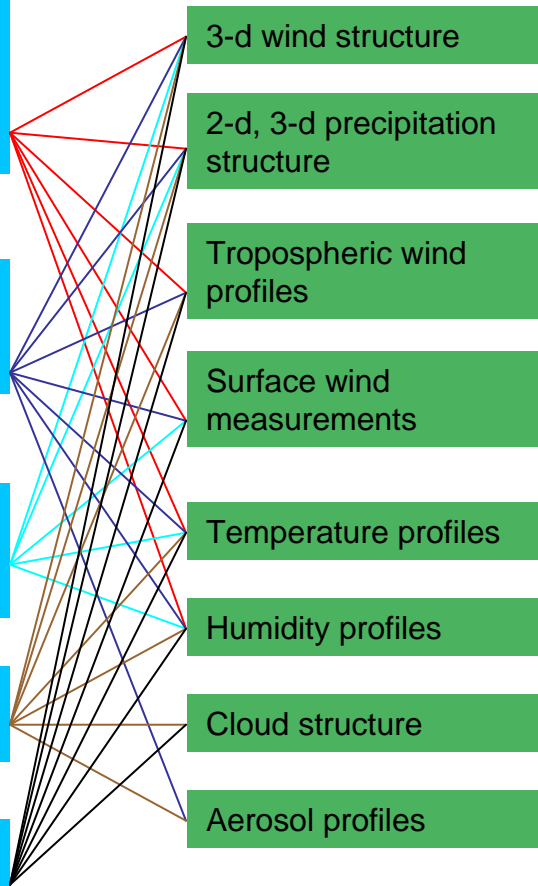
Cloud structure

Aerosol profiles

Instrument Functional Requirements

Fully autonomous for long duration

Must fit in available payload bays



The measurement requirements and instrument functional requirements will determine which instruments are selected for the GH and DC-8 (ER-2?)

Summary: NASA participation in 2010 Hurricane Field Experiment

Global Hawk (UAV) (240 hours)

- Radar, Microwave Radiometers, Dropsondes, Electric Field

DC-8 four engine jet (120 hours)

- Dual frequency precipitation radar, Microwave radiometer
- Dropsondes, Variety of microphysics probes
- Lidars for 3-D Winds and for high vertical resolution measurements of aerosols and water vapor
- In-situ measurements of temperature, moisture and aerosols

ER-2 high altitude aircraft??

Six to Eight week deployment centered on September 1, 2010

NPOL and/or TOGA radars and radiosonde launch facility near Miami, FL



Global Hawks

AV-6

AV-1





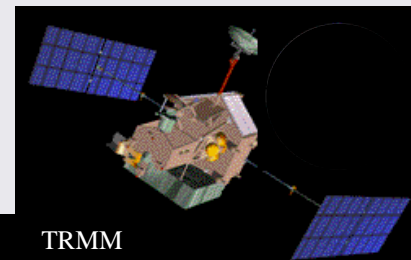
RESEARCH SYNERGY



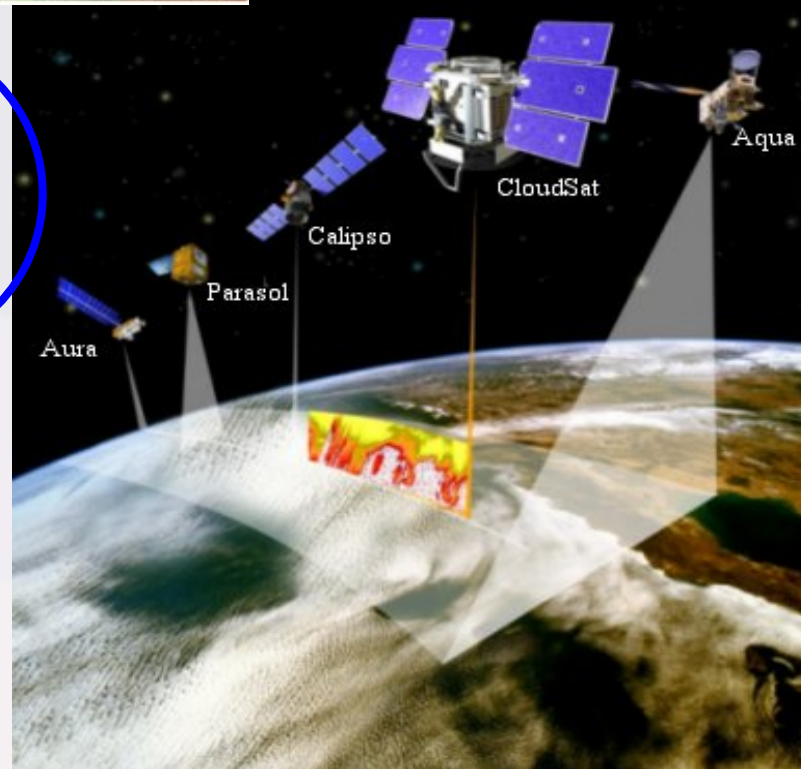
Models

Aircraft

Satellite



TRMM



Aura

Parosol

Calipso

CloudSat

Aqua



A Three-Pronged Approach