

National Center for Atmospheric Research

Boulder, CO



- Severe Weather
- Climate Processes
- Atmospheric Chemistry
- Atmospheric Patterns
- Ocean-Atmosphere Interactions



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www.eol.ucar.edu/predict

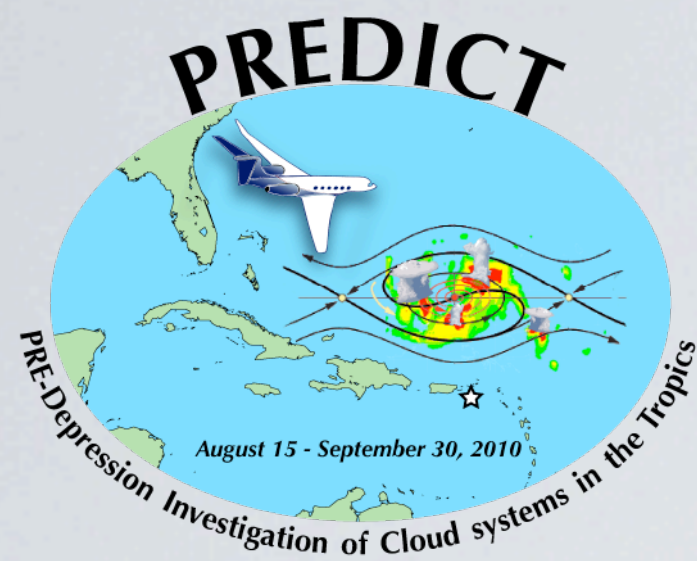
PREDICT

PRE-Depression Investigation of Cloud systems in the Tropics

August 15 - September 30, 2010
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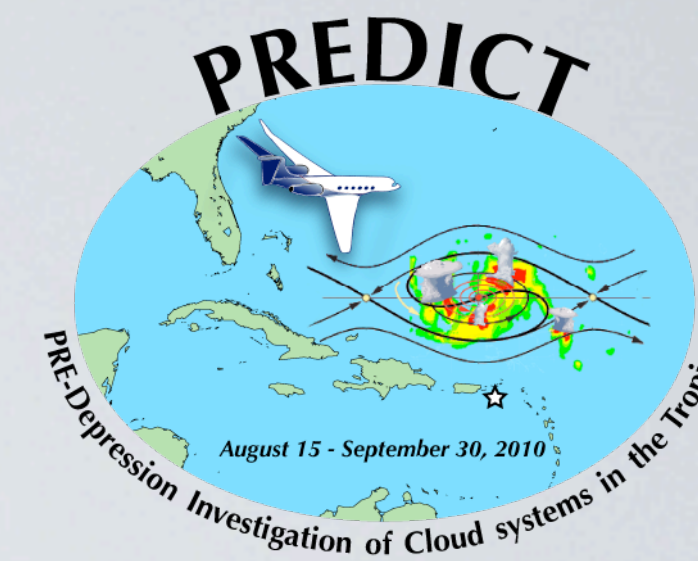


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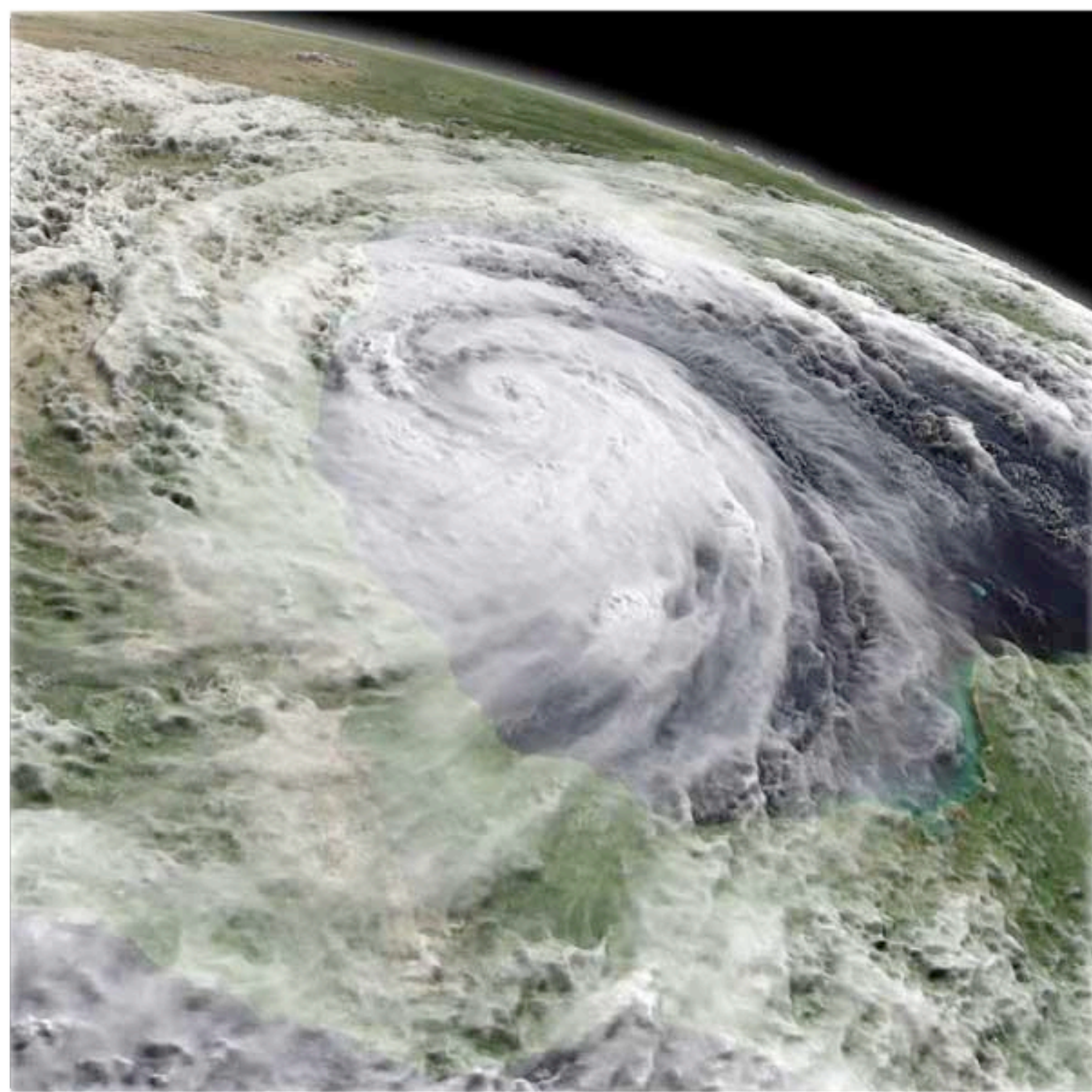


PREDICT

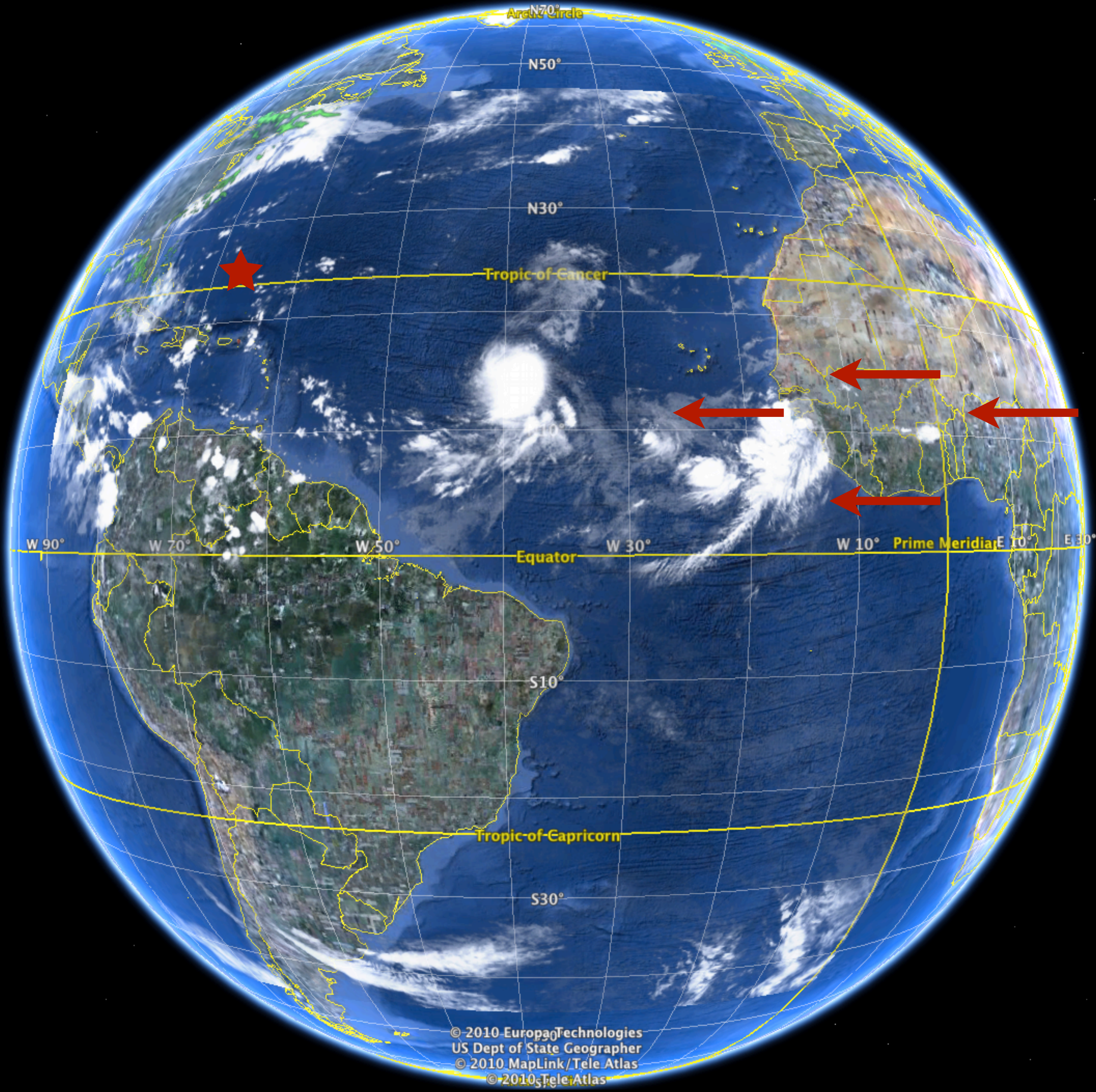
Pre-Depression Investigation of Cloud Systems in the Tropics



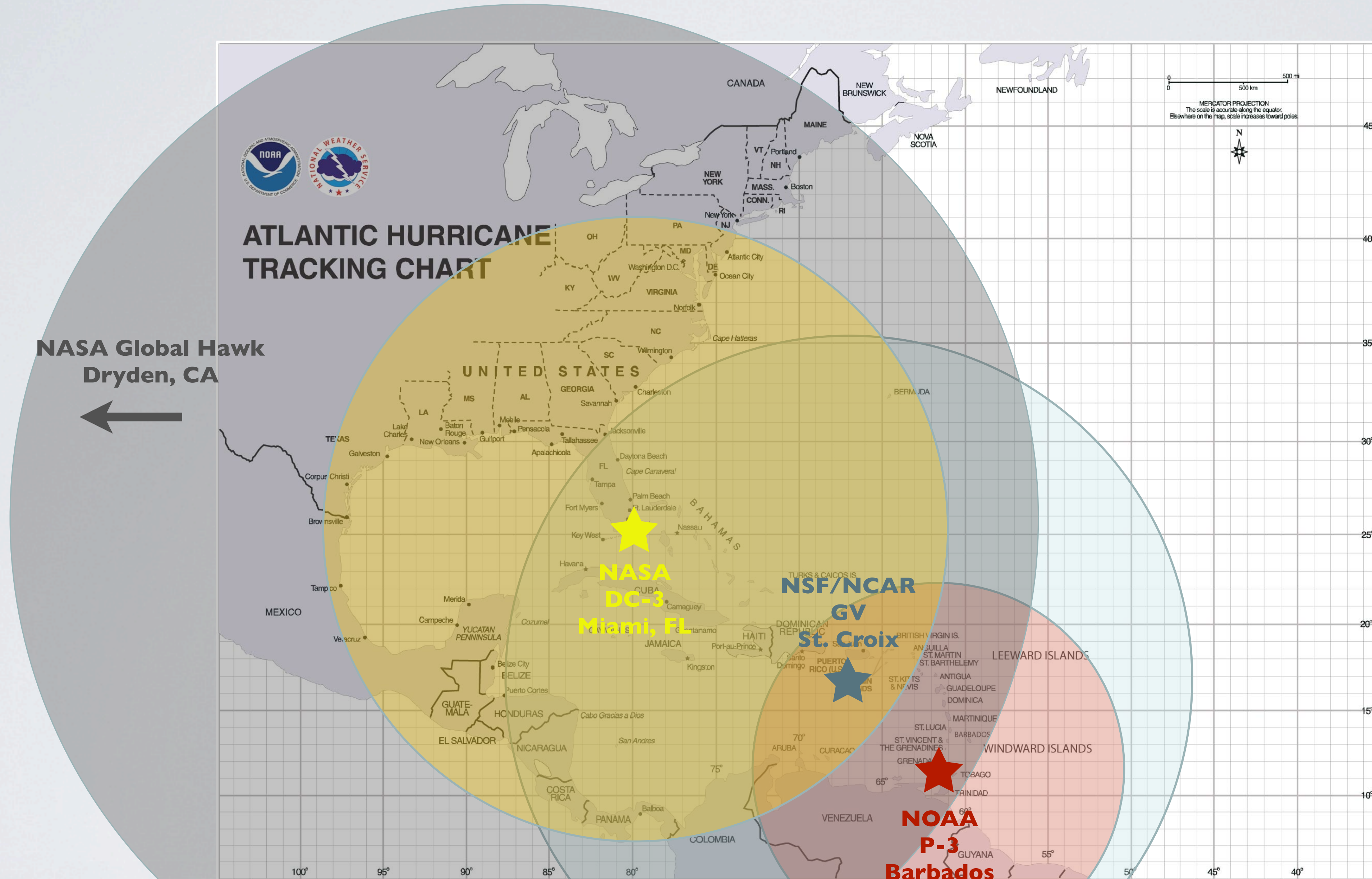
Why do some tropical storms form into hurricanes and others don't?



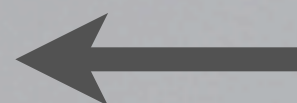
Developing storms traveling west off the coast of Africa ~12°N



Tri-Agency Ranges :: NCAR, NASA, & NOAA



NASA Global Hawk
Dryden, CA



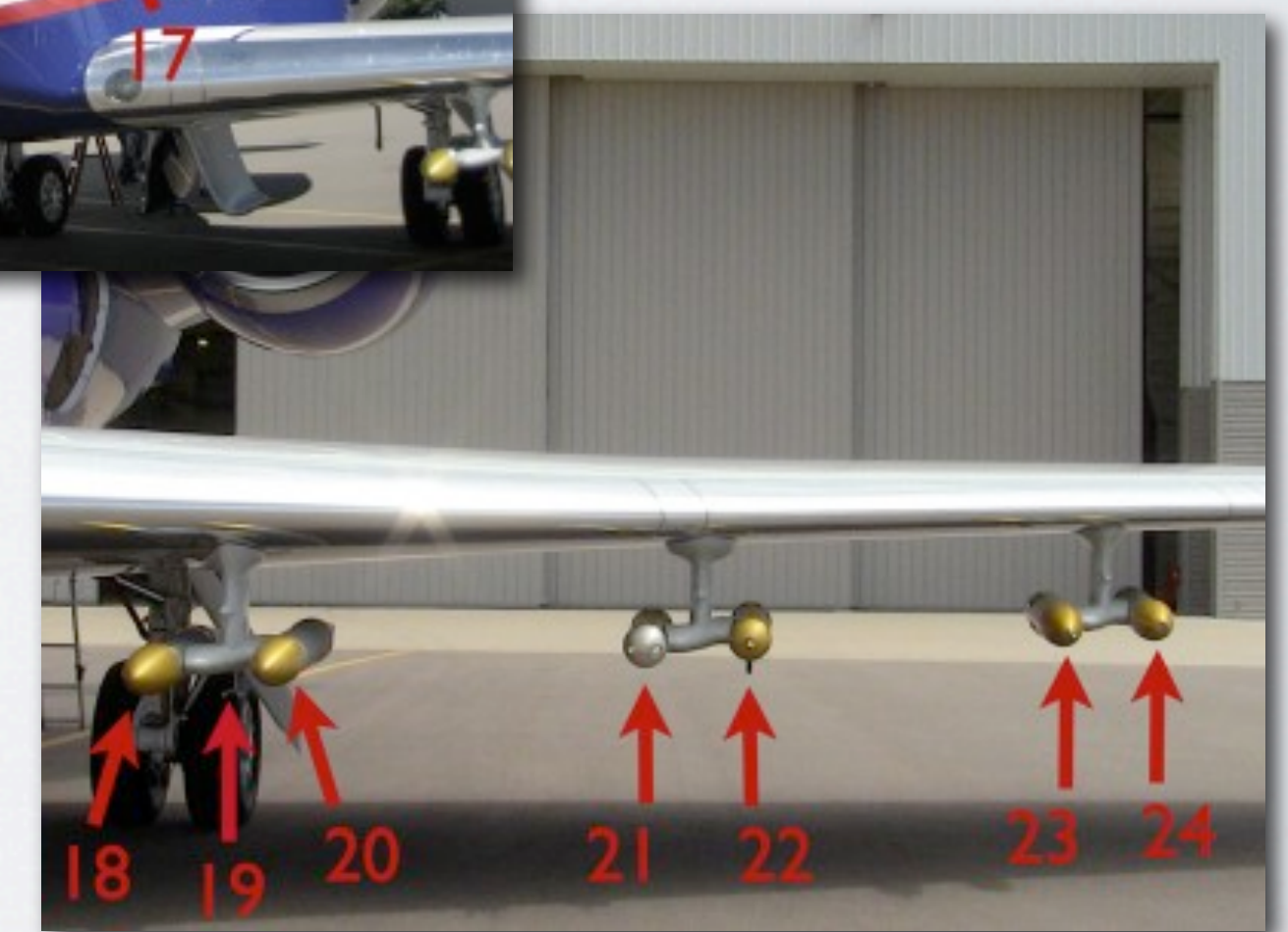
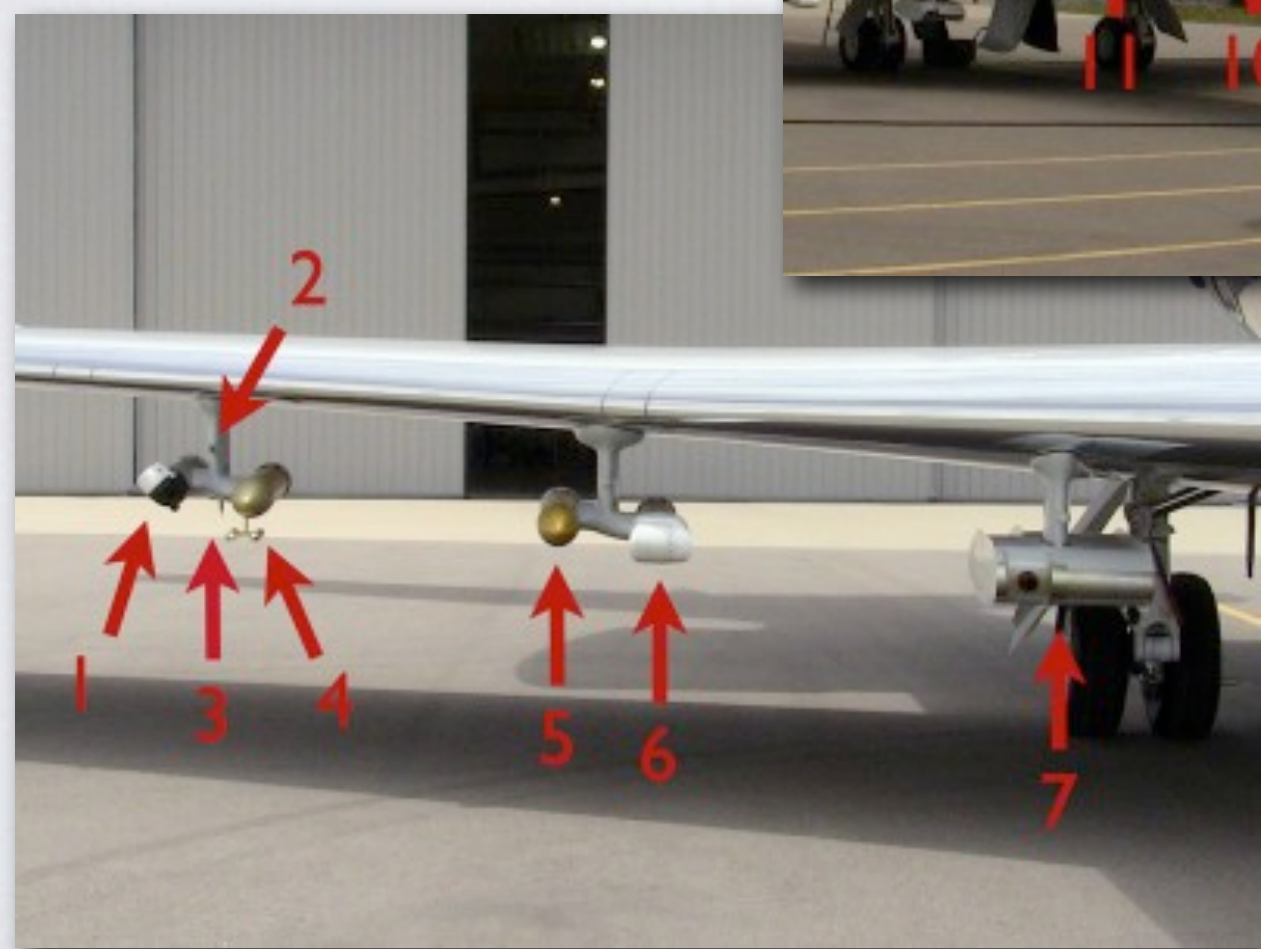
NCAR :: PREDICT
NASA :: GRIP
NOAA :: IFEX

Instrument Suite For PREDICT

- **Standard Instrumentation**
 - GPS
 - Thermodynamic Variables
- **Atmospheric Profiling**
 - Humidity
 - Temperature
 - Pressure
 - Water :: Gas, Liquid, & Ice
 - Wind Speed
 - Wind Direction
- **Aerosols, Particles, & Gases**
 - Ozone (O_3)
 - Cloud Droplets



NSF/NCAR Gulfstream V Exterior Instrument Payload



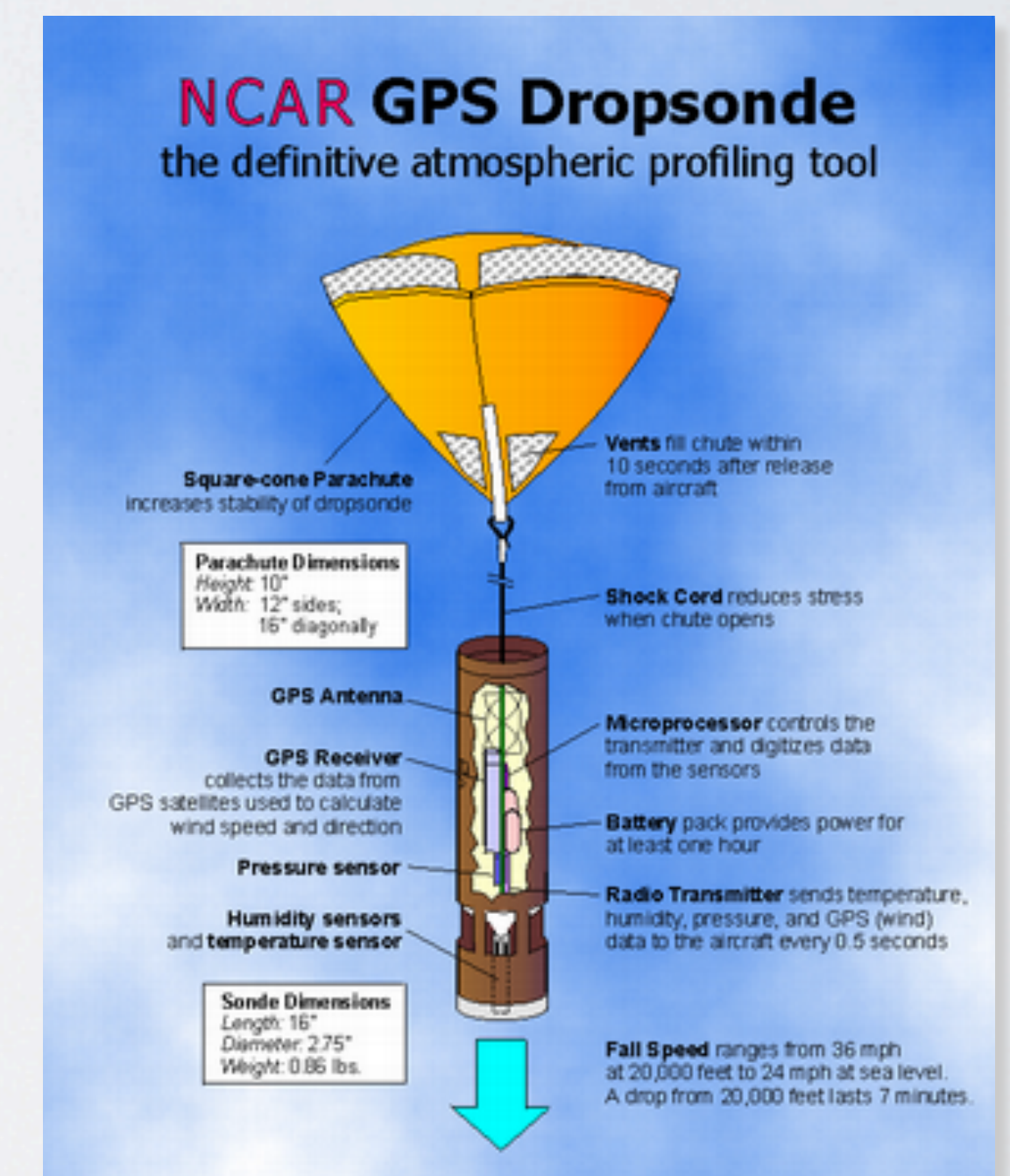
What Is a Dropsonde?

How they work:

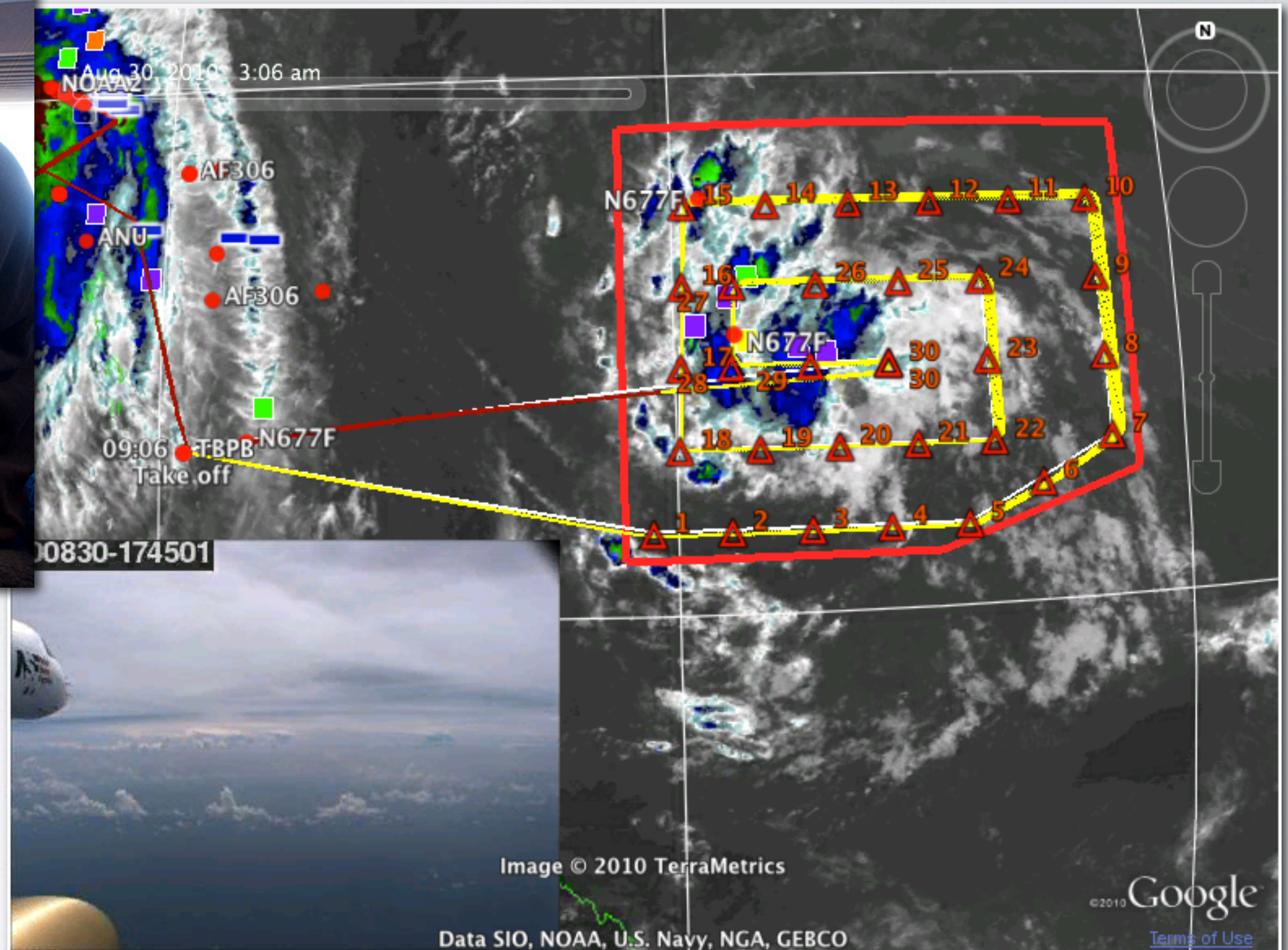
- ~20 are ejected from the aircraft per research flight
- Released above weather disturbances or around 42,000'
- Data is transmitted back to aircraft as dropsonde falls to water below

Measures Vertical Profiles of:

1. Wind Speed (GPS)
2. Wind Direction (GPS)
3. Temperature (thermometer)
4. Pressure (pressure gauge)
5. Humidity (hygrometer)

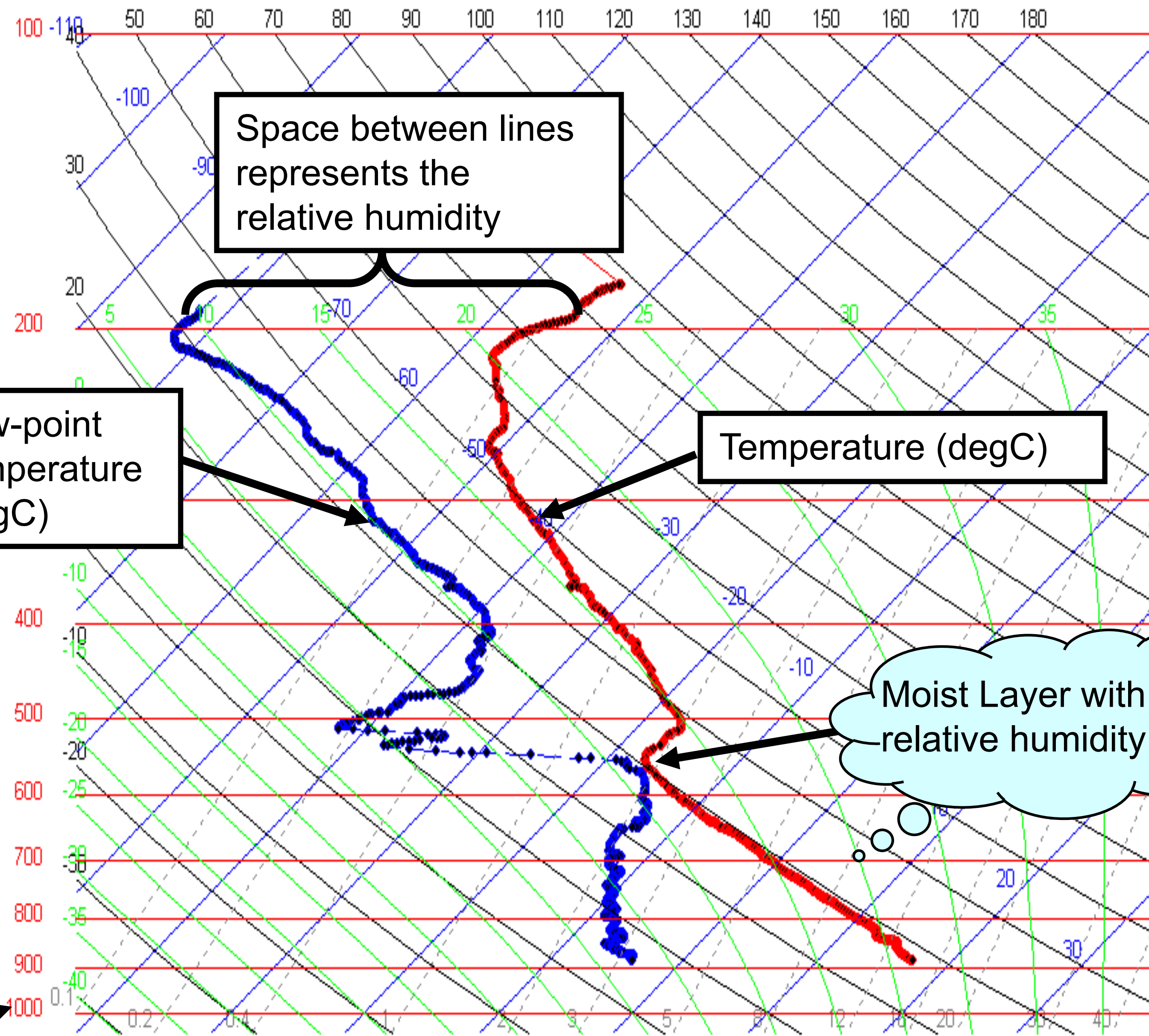


NSF/NCAR Gulfstream V Typical Flight Path Over Storm



 Dropsonde locations

Sounding Profile



Wind barbs show strength and direction of wind

Space between lines represents the relative humidity

Dew-point Temperature (degC)

Temperature (degC)

Moist Layer with high relative humidity

Atmospheric pressure at sea level is ~1000 millibars and decreases with height

Atmospheric Profile & Temperature Range

THERMOSPHERE

Mesopause :: ~54 miles

MESOSPHERE

Nitrogen 78%
Oxygen 21%
H₂O Vapor 0-4%
Argon .93%

Stratopause :: ~30 miles

STRATOSPHERE

Tropopause :: ~8 miles

Average dropsonde height
~8 miles or 42,000'

TROPOSPHERE

-120

-80

-40

0

40

80

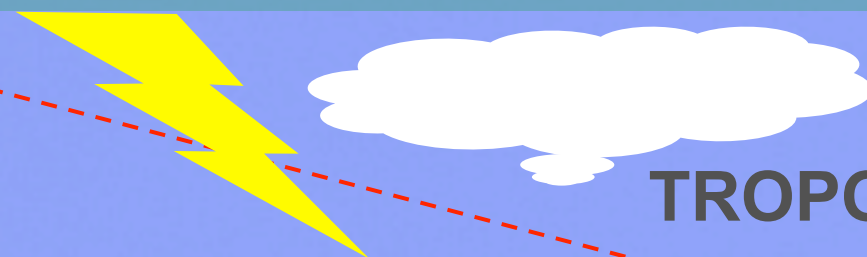
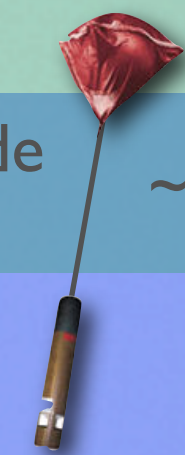
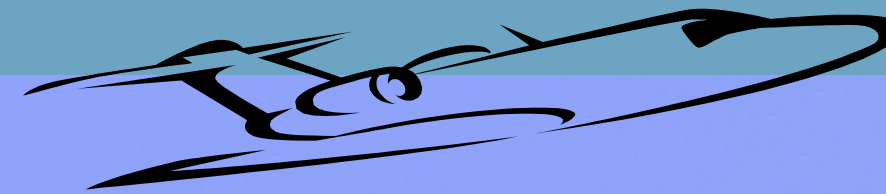
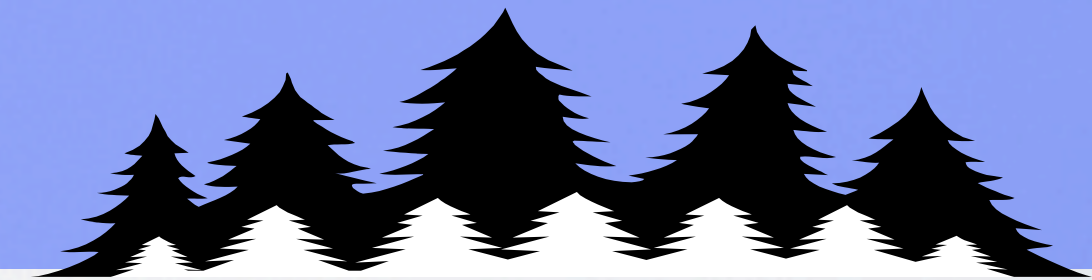
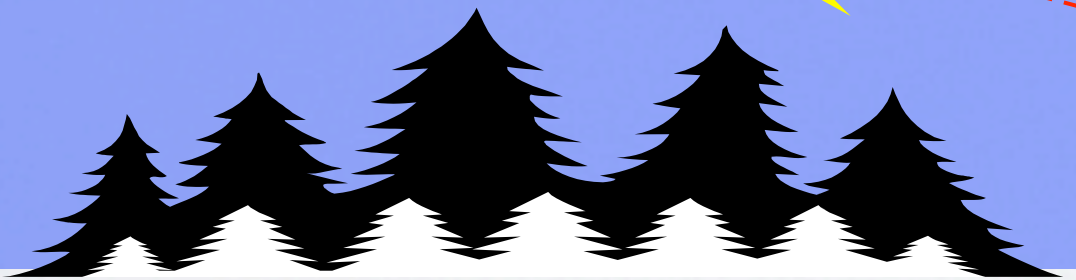
120

Temperature (°F)

Diagram Courtesy of Kate Young/ EOL

Altitude (miles)

Altitude (miles)

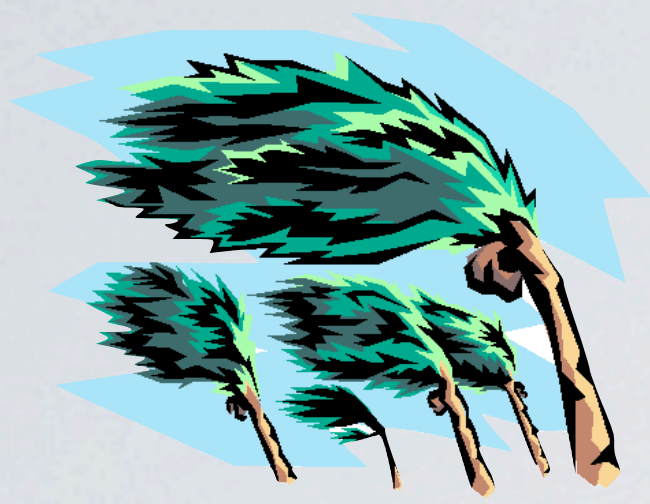


*Probing the air at high altitude
and high speed*

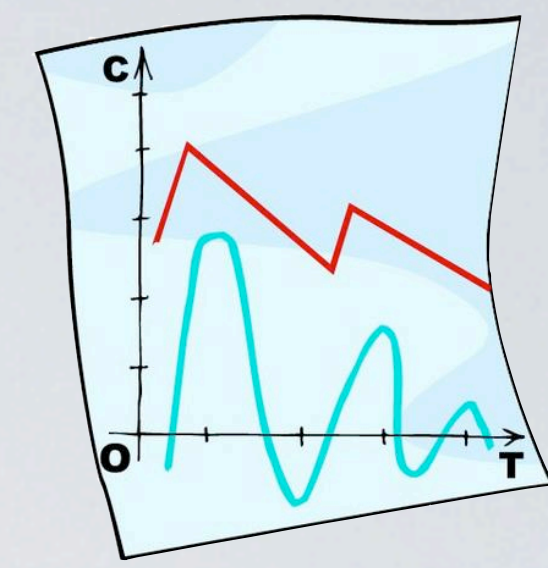
**Dropsonde Weather Instruments
Launching from HIAPER
The NSF/NCAR G-V Aircraft**

NCAR & UCAR Science

ucar.edu/news

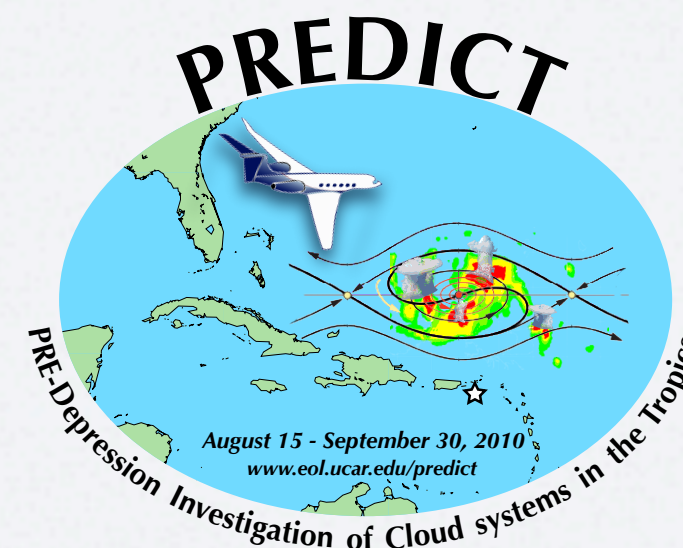


How Is This Data Helpful???



The data allows us to:

- Target to remote locations that have no land observations available
- Learn more about the early development of storm systems
- Examine why some storms develop into hurricanes and others do not
- Better predict what storms will turn into hurricanes, allowing for better preparation in communities like yours!



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