Summary From Day 1

Science Objectives

PREDICT: Genesis
GRIP: Genesis and Rapid Intensification
IFEX: Genesis, RI, Mature State, Decay (including RD)

PREDICT Science Interests (G-V specific)
Evaluation of marsupial hypotheses
- Existence and structure of pouch
- Thermodynamic conditions within and external to “pouch”
- Divergence profiles

Interrelation of numerous genesis pathways
- Vertical shear over time
- Existence of “sweet spot” and relation to marsupial theory

Cloud physics and aerosol influence
Ensemble data assimilation; utilize G-V data, predictability (in marsupial framework)

Summary From Day 1

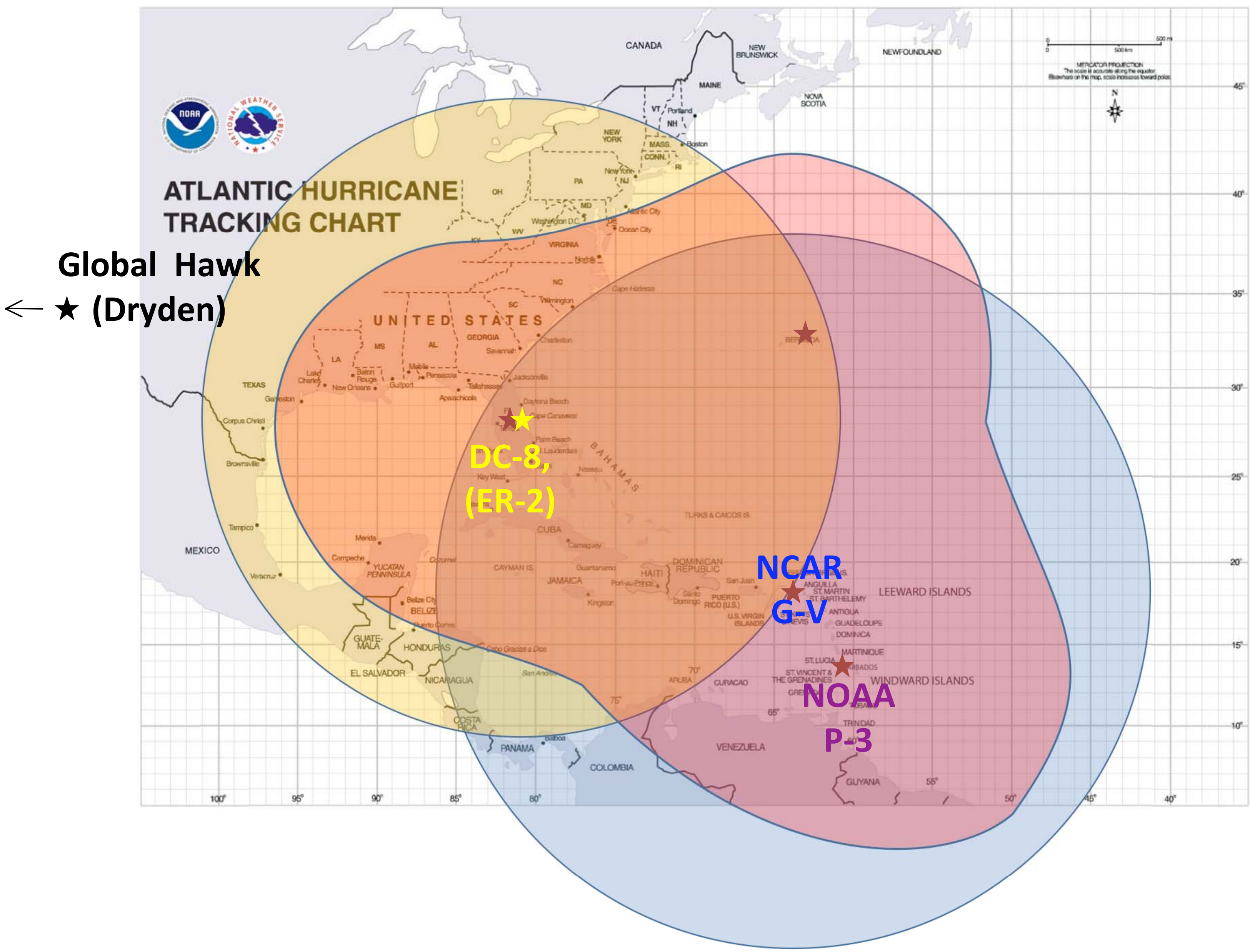
Science Objectives

PREDICT+GRIP+IFEX: goal is nearly continuous-in-time coverage of pre-depression through hurricane

Measurement objectives: All the above, plus

- Convection: what is the difference inside vs. outside the pouch?
- Documenting presence and structure of VHTs
- Mass flux profiles (divergence profiles)
- Circulation budgets

Multi-scale data assimilation efforts

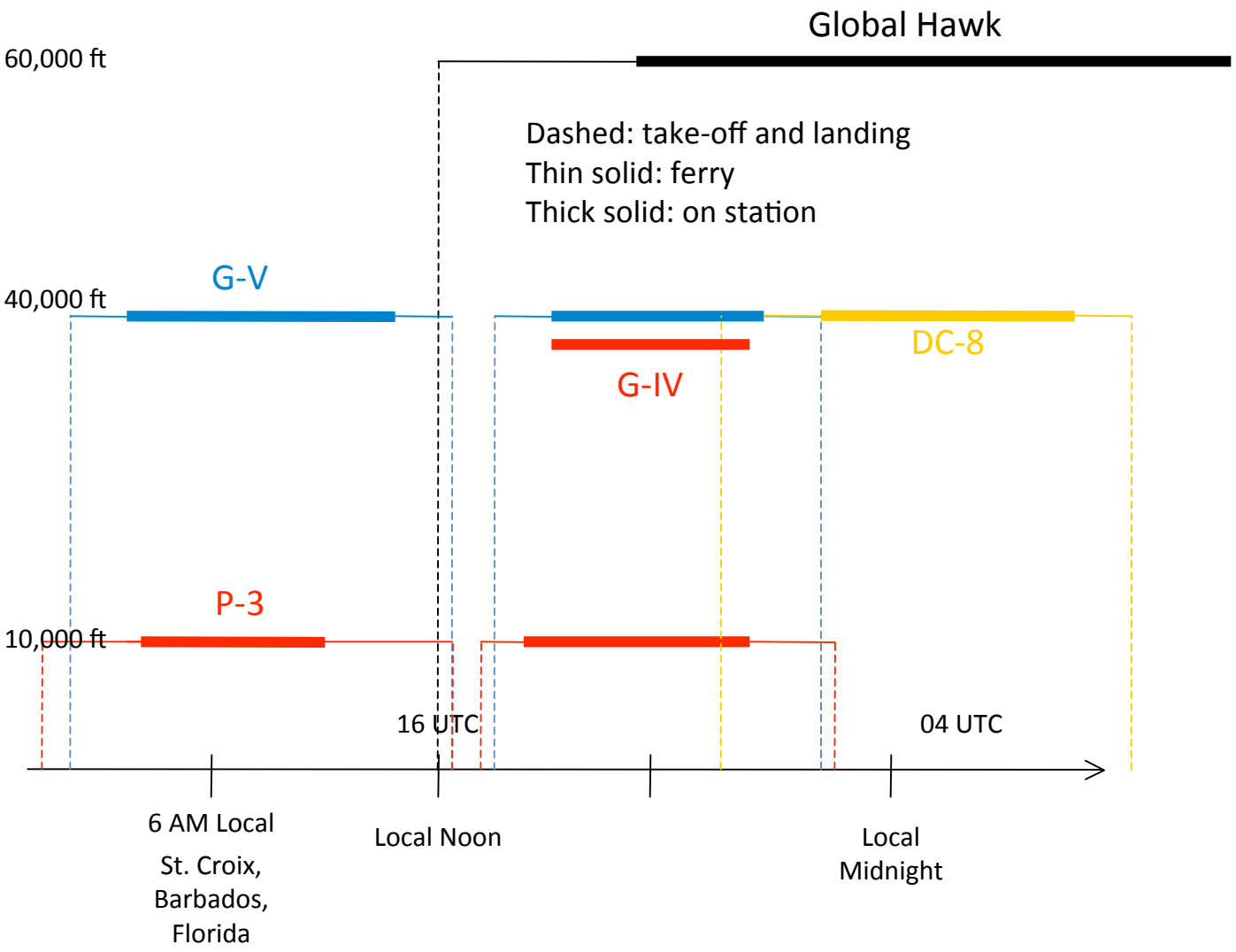


Global Hawk
← ★ (Dryden)
ATLANTIC HURRICANE
TRACKING CHART
DC-8,
(ER-2)
NCAR
G-V
NOAA
P-3
UNITED STATES
CANADA
MEXICO
CUBA
BAHAMAS
LEEWARD ISLANDS
WINDWARD ISLANDS
VENEZUELA
COLOMBIA

Scenarios

1. G-V + NOAA + NASA
    - G-V 2 crews + NOAA (2 P-3s + G-IV) + NASA (DC-8 + GH) (the whole enchilada)
    - G-V 1 crew + …
    - G-V 2 crews + NOAA (just 2 P-3s) + NASA….
    - …..
2. G-V + NOAA
3. G-V + NASA
4. G-V
5. NOAA + NASA
6. NOAA
7. NASA

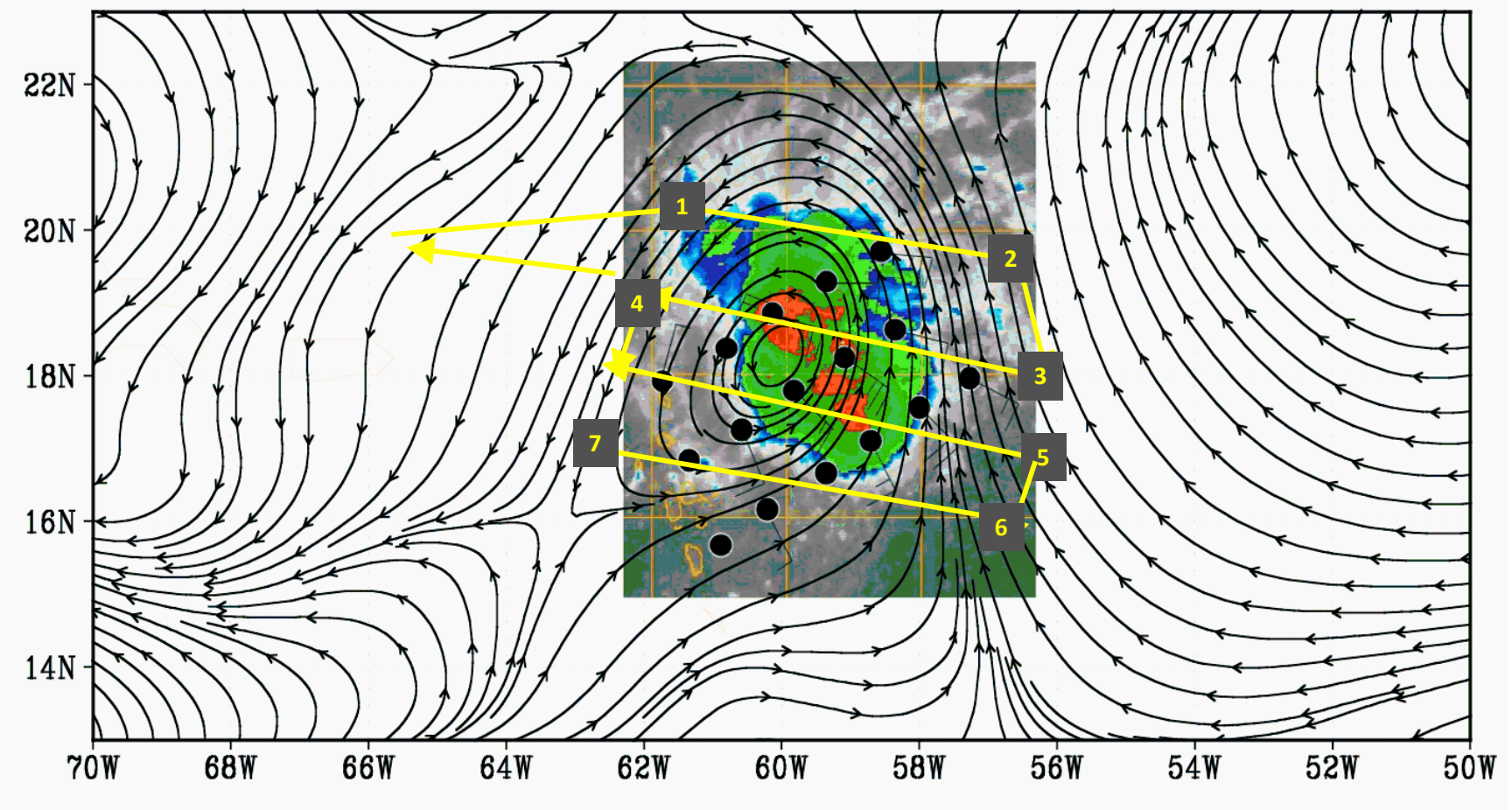
Flight Timing



Scenarios

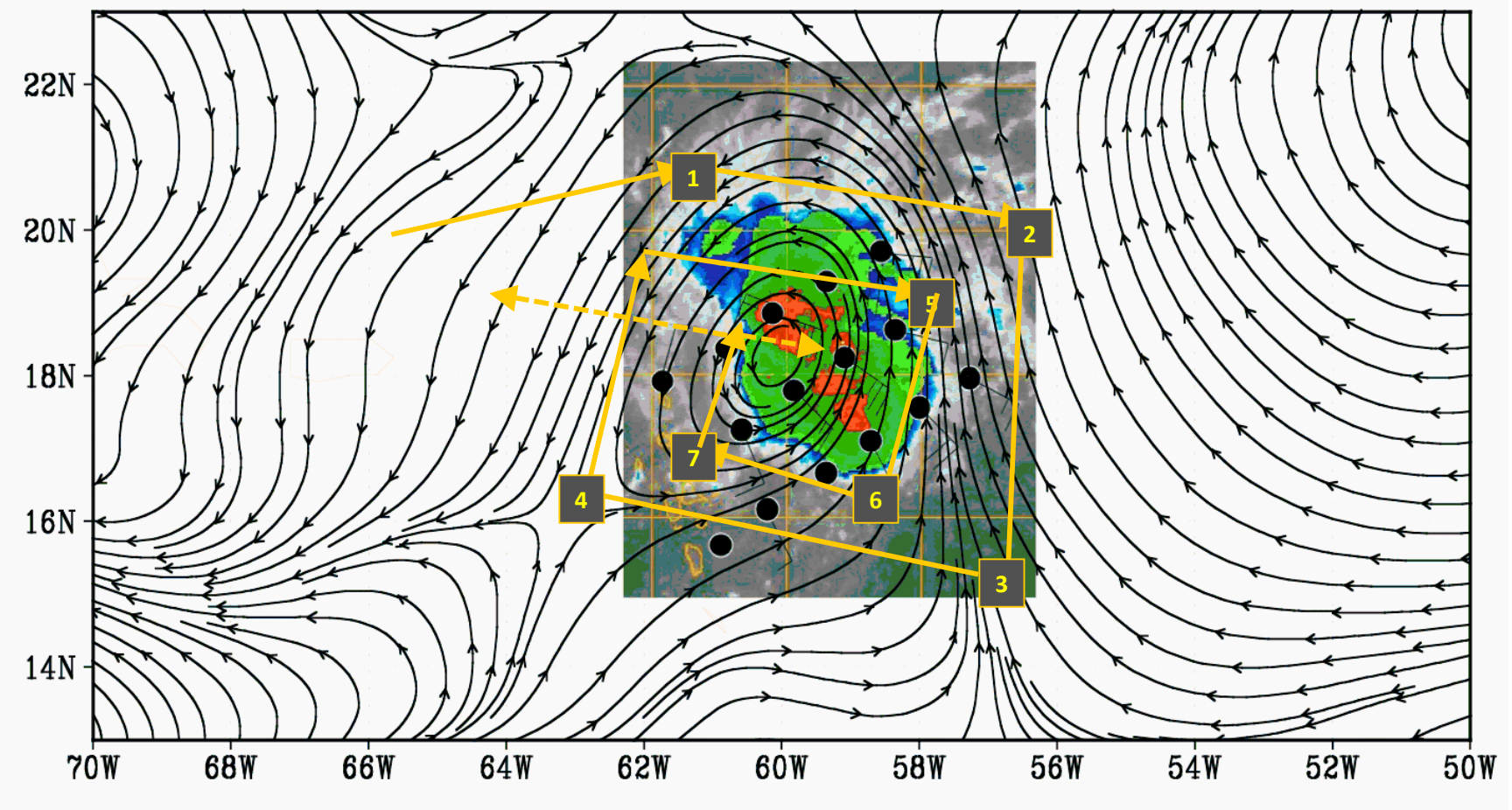
- G-V alone: east or northeast of NOAA range; survey pattern
  - 1 flight per day; max duration, arrive near sunrise
- G-V and NOAA P-3:
  - 2 G-V flights per day possible 1-15 Sept., otherwise 1 max duration flight
  - 1 P-3 and 1 G-V flight; see Fay example. G-V on-station 1-3 h longer than P-3
  - 2 P-3 and 1 G-V: G-V to arrive 1-2 h later than P-3, max duration, overlap both P-3 flights (assumes P-3s launched sequentially)
  - 2 P-3 and 2 G-V: see Fay example: G-V flight 1 arrive target at sunrise. G-V flight 2 depart target at sunset.
- G-V, P-3 and NASA DC-8
  - G-V and DC-8 back-to-back
  - G-V to sample early wave disturbances to genesis; DC-8 from genesis to RI
  - Coordinate with P-3
- Global Hawk (GH)
  - Night missions: G-V daytime, GH at night
  - May coordinate with P-3 and DC-8

G-V “Square-8” with NOAA



Shading: GOES-IR imagery
Zonally translated 700 hPa streamlines (C~ -6 m/s)

G-V “Square-Spiral” with NOAA



Shading: GOES-IR imagery
Zonally translated 700 hPa streamlines (C~ -6 m/s)

Thoughts on Coordination of Patterns

- In general, stagger in time or altitude to maximize 4-D coverage
- If G-V + P-3s, arrive on station at same time, but opposite sides; cross paths one time
- If G-V and G-IV simultaneous, 2 choices:
  - Similar altitude, try to stagger a few hours in time, one follows the other in pattern
  - Stagger in altitude: which plane is high and which is low. How low is low? Altitudes to consider 390, 290, 120
- If G-V and DC-8 simultaneous, same issues as above

Concerns

- Dropsonde locations relative to lower aircraft
- In-flight communications – any potential issues?
- Flexibility of altitude/path changes: assume little

Flight Tracks and Strategies

- Targets
  - Lower-tropospheric cyclonic vorticity region (large OW)
  - Persistent convection (not necessarily continuous)
  - Closed system-relative streamlines
  - Evidence of high PW or mid-trop humidity
  - Downshear side of upper trough (if present)

Flight Tracks

- Guidelines
  - Not targeting convection (except anvils of opportunity)
  - Probably prefer to go east vs. west
  - Time continuity critical (minimize jumping around)
  - Try for long (500 km+) legs

Flight Tracks

- Limitations: what we will avoid
  - Deep convective towers
  - Systems over land
  - Airport approach/departure lanes
  - Tropical storms and hurricanes (unless there are obviously sufficient flight hours and no other targets)
  - Western Gulf of Mexico (forward deploy?)
  - One-shot systems (unless we are desperate)

Forecast/Planning Requirements

T-4 to T+10 h

1.Go/No-go decision (T-3)
2.Analysis to adjust flight pattern
3.Monitoring convective development
4.Terminal area nowcast and forecast

T-24 h

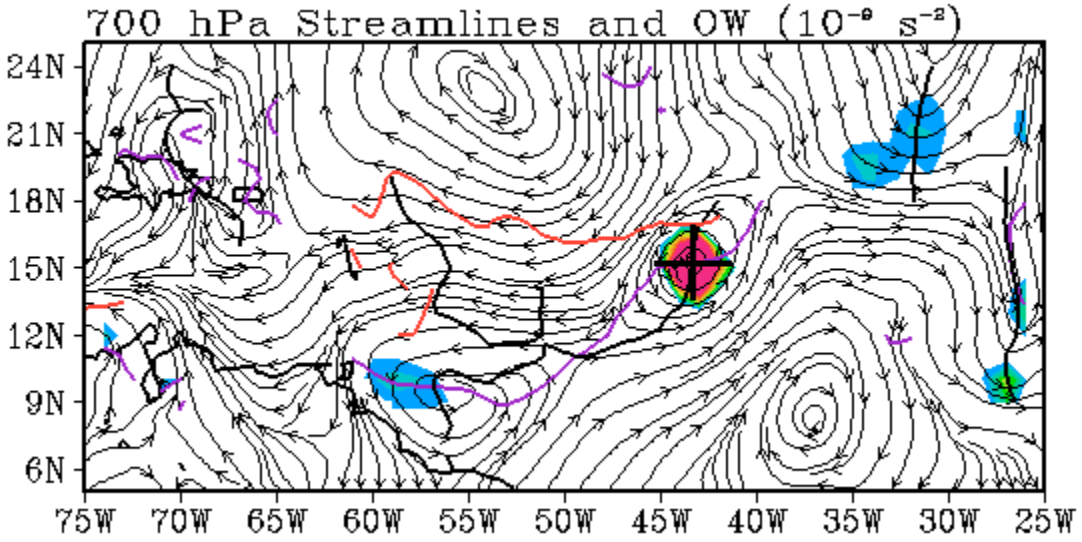
1.Confirm target and IP
2.Construct flight tracks
3.Alert crews
4.Terminal area and alternate base fcst.

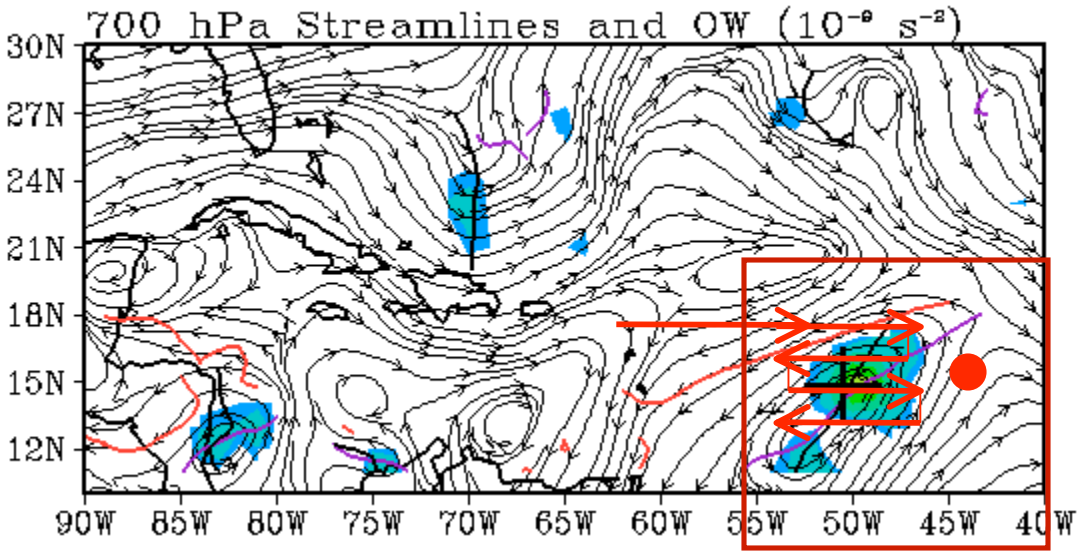
T-72 to T-48 h

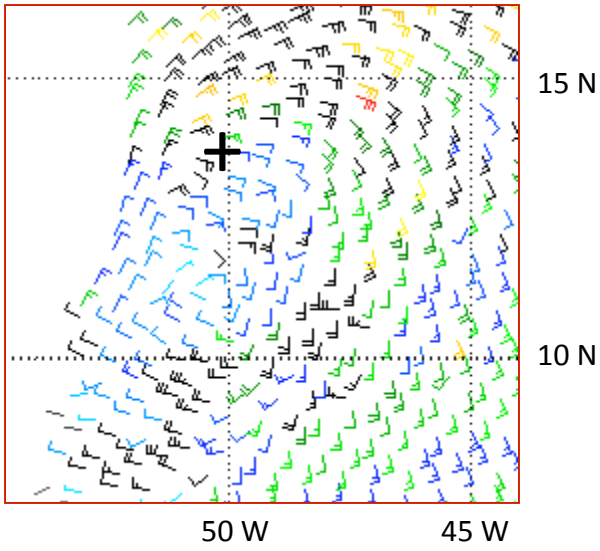
1.Identify target system
2.Notify
3.Terminal area and alternate base fcst.
4.Forward deploy scenarios for NOAA/NASA

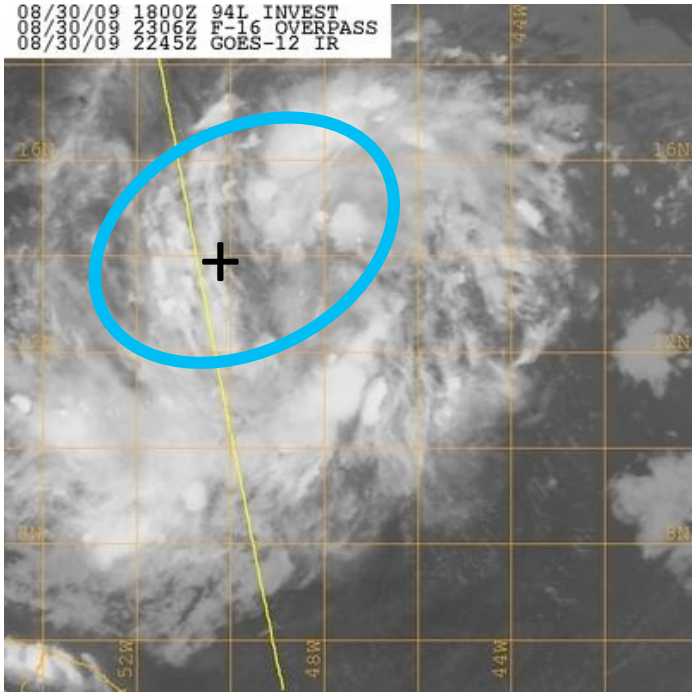
T-5 d

1.Outlook

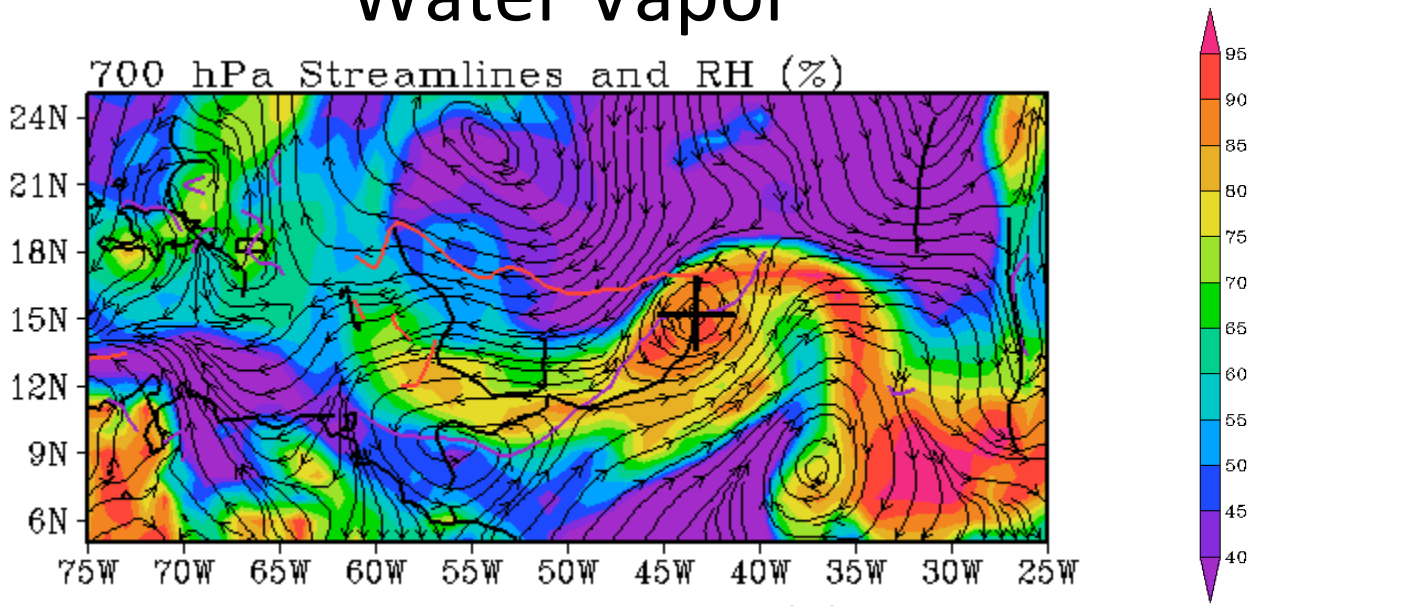

700 hPa Streamlines and OW (10⁻⁶ s⁻²)
24N
21N
18N
15N
12N
9N
6N
75W 70W 65W 60W 55W 50W 45W 40W 35W 30W 25W

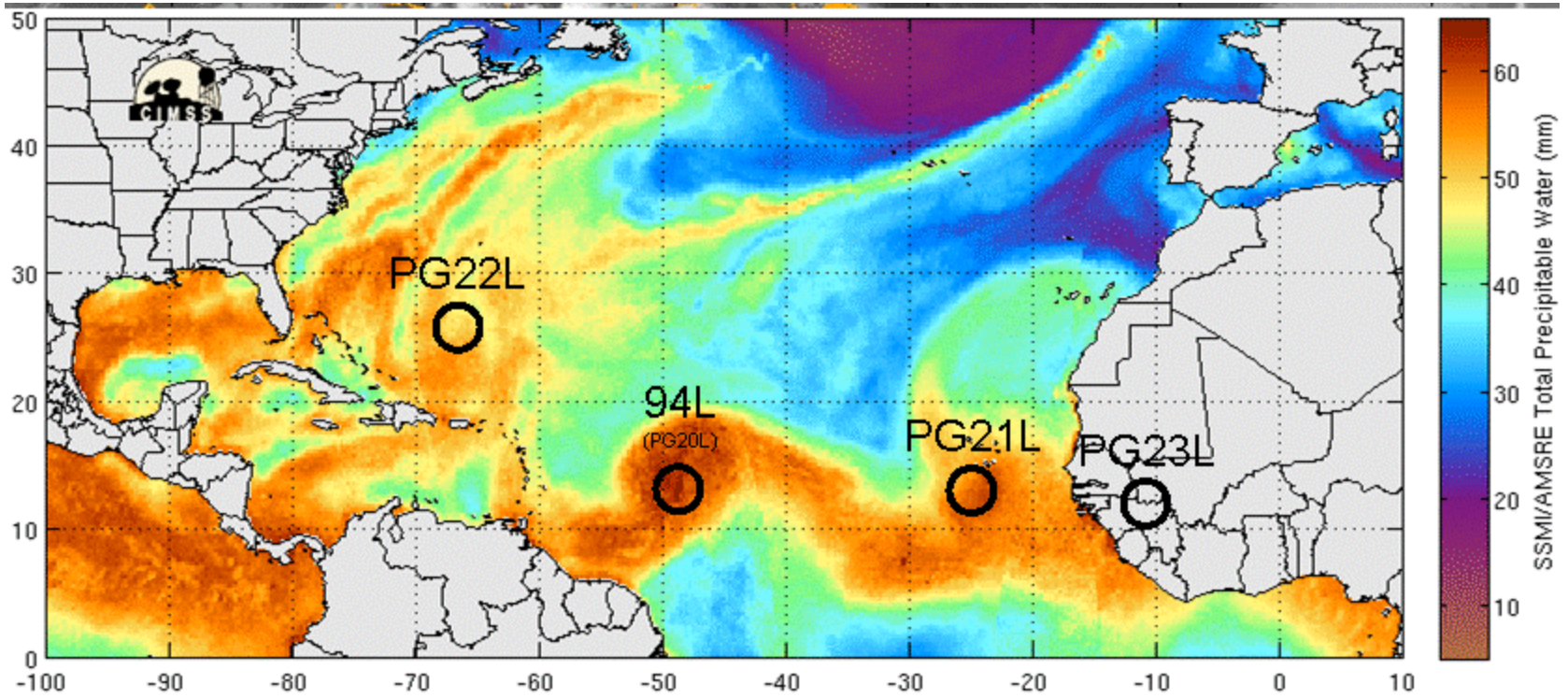

700 hPa Streamlines and OW (10⁻⁶ s⁻²)
30N
27N
24N
21N
18N
15N
12N
90W 85W 80W 75W 70W 65W 60W 55W 50W 45W 40W


15 N
10 N
50 W
45 W


08/30/09 1800Z 94L INVEST
08/30/09 2306Z F-16 OVERPASS
08/30/09 2245Z GOES-12 IR

Water Vapor


700 hPa Streamlines and RH (%)
24N
21N
18N
15N
12N
9N
6N
75W
70W
65W
60W
55W
50W
45W
40W
35W
30W
25W
95
90
85
80
75
70
65
60
55
50
45
40


PG22L
94L
(PG20L)
PG21L
PG23L
SSMI/AMSRE Total Precipitable Water (mm)
60
50
40
30
20
10
50
40
30
20
10
0
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10

Personnel

- Single crew periods (15-31 Aug.; 15-30 Sept)
  - Operations Director
  - Science Director
  - Aircraft Coordinator
  - Forecaster/Nowcaster (1 or 2 jobs?)
  - Mission Scientist
  - Logistical support person
- Double crew period (1-14 Sept)
  - Double everything above

Personnel

- Operations Director
  - Jorgen Jensen, Jose Meitin
- Science Director
  - Mike Montgomery, Chris Davis, Lance Bosart
- Aircraft Coordinator
- Forecaster/Nowcaster (1 or 2 jobs?)
  - Lance Bosart (lead)
- Mission Scientist
  - Michael Bell, Dave Raymond, Carlos Lopez, Andy Heymsfield
- Logistical support person

Contingency Planning

- Evacuation in case of storm threatening
  - Lead time required?
  - Alternate bases?
  - How long can we operate at alternate?
  - What if St. Croix becomes unworkable for weeks?

What do we do if there are no viable waves?

- Sampling organized convectionAnvils
  - Environment
  - Contrast MCSs in waves and not in waves (or in very weak waves)
- Saharan Air Layers
  - Low-altitude flight patterns (2-5 km)
  - Satellite validation of temperature and humidity structure
- Consider East Pac?
  - Too far from St. Croix: forward deploy?