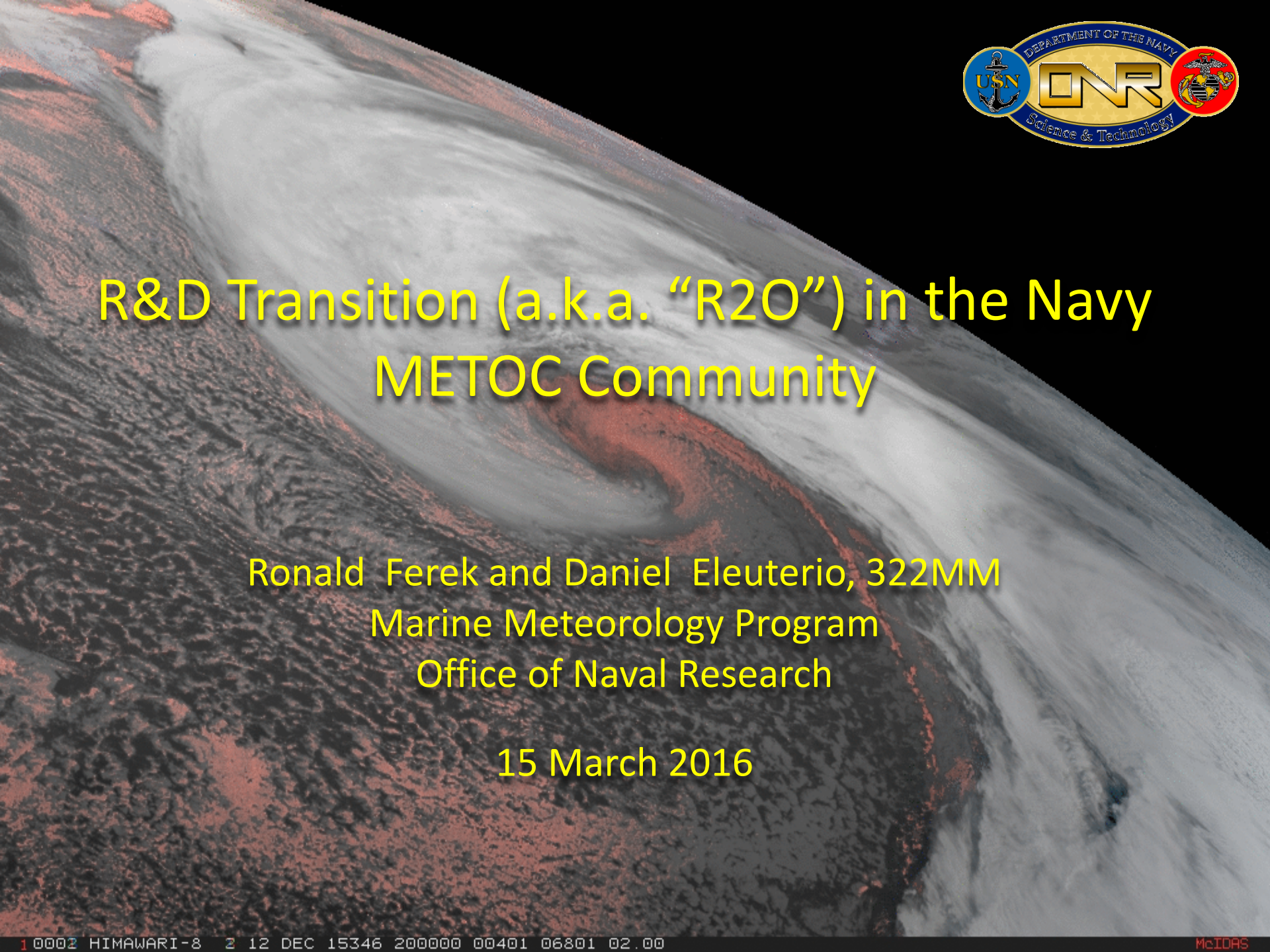
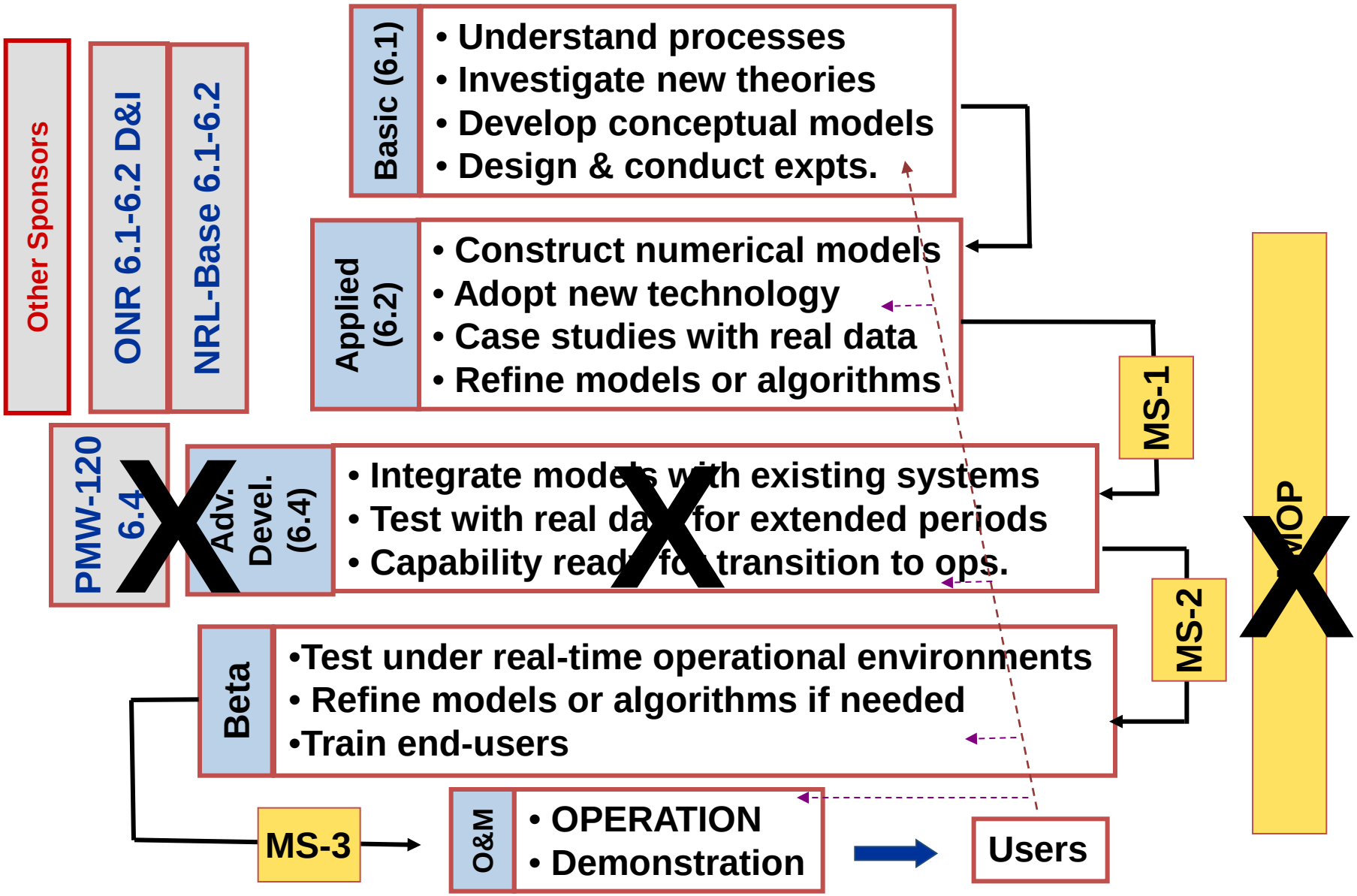


R&D Transition (a.k.a. "R2O") in the Navy METOC Community

Ronald Ferek and Daniel Eleuterio, 322MM
Marine Meteorology Program
Office of Naval Research

15 March 2016

X = “Valley of Death”



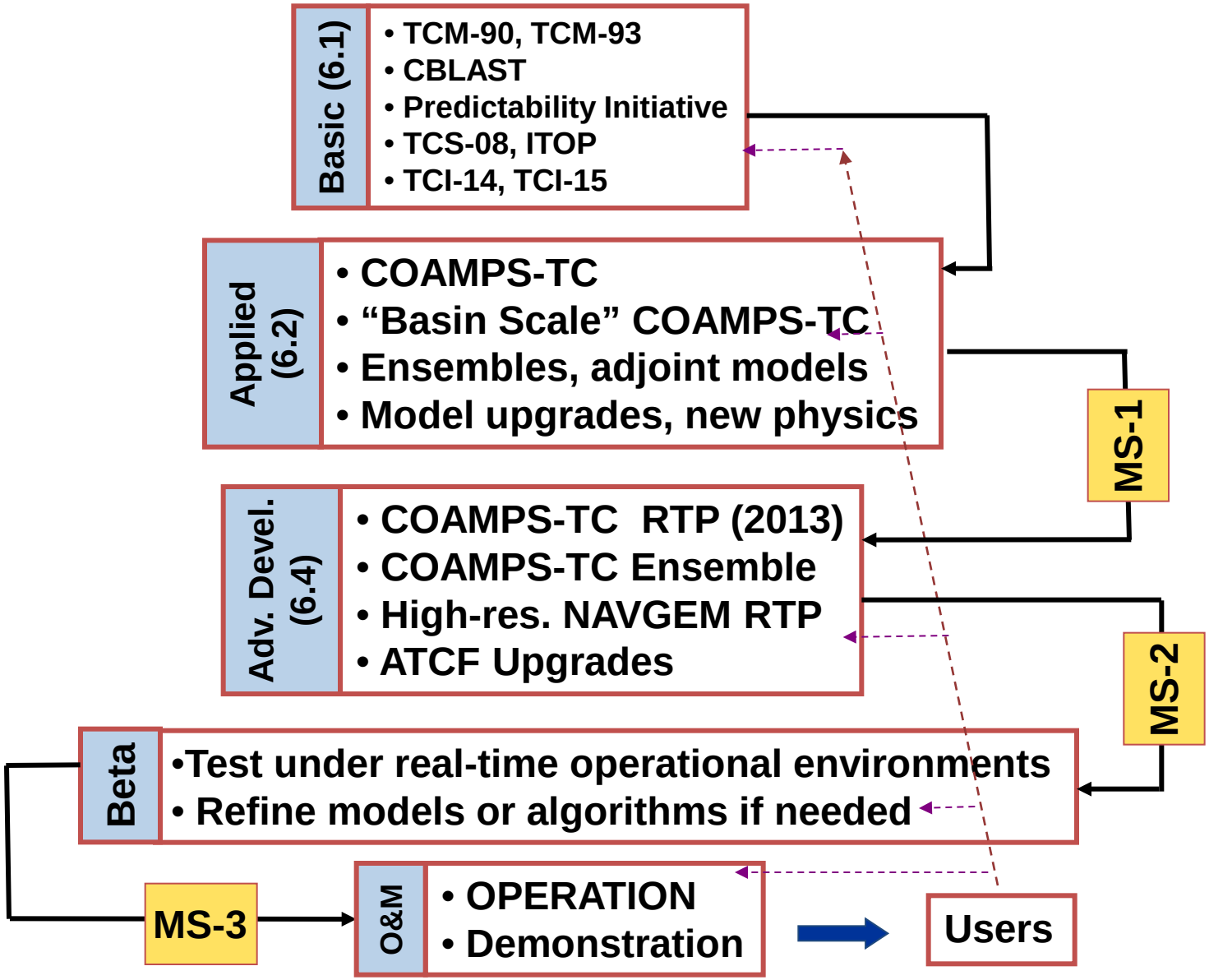
Item \ Phase	Applied Research /Technology Development	Demonstration/ Validation (DEM/VAL)	Operational Implementation	Operations
Resource Sponsor (Funding Category)	ONR/Other (6.2 RDT&E)	CNO N84 or Other Agent (6.4 RDT&E)	CNO N84 or Other Agent (6.4 RDT&E and CNMOC O&M,N)	CNO N84 or Other Agent (CNMOC O&M,N)
	Rapid Transition Process			
Objective	• Initial Development Through Proof-Of-Concept • Requirements review	• Technical Validation • Developer control • Demonstration (Incl Pseudo Ops Implementation)	• Full Integration • Ops control • OPEVAL – OPCHECK – OPTEST	• Operation & Maintenance • Life-Cycle Support
			Technical Support & "Warranty" Service	
Deliverables	• Journal, Publication or Technical Report • Draft Transition Plan	• Source Code • Model Transition Plan • Validation Test Report • Preliminary DOD-STD Documentation (*SDD&UG*)	• Final DOD-STD Documentation • OPTEST Report	• Upgrades and Fixes • Upgrade Plan
TRL	2-3	4-6	7-9	10
		Administrative Model Oversight Panel		
Participants	• ONR PIs • NRL Developer • Non-Navy S&T	• Transition Agent • Tech Validation Panel	• Implementation Panel (IP)	• NAVO/FNMOC/ Configuration Control Boards

MS I MS II MS III

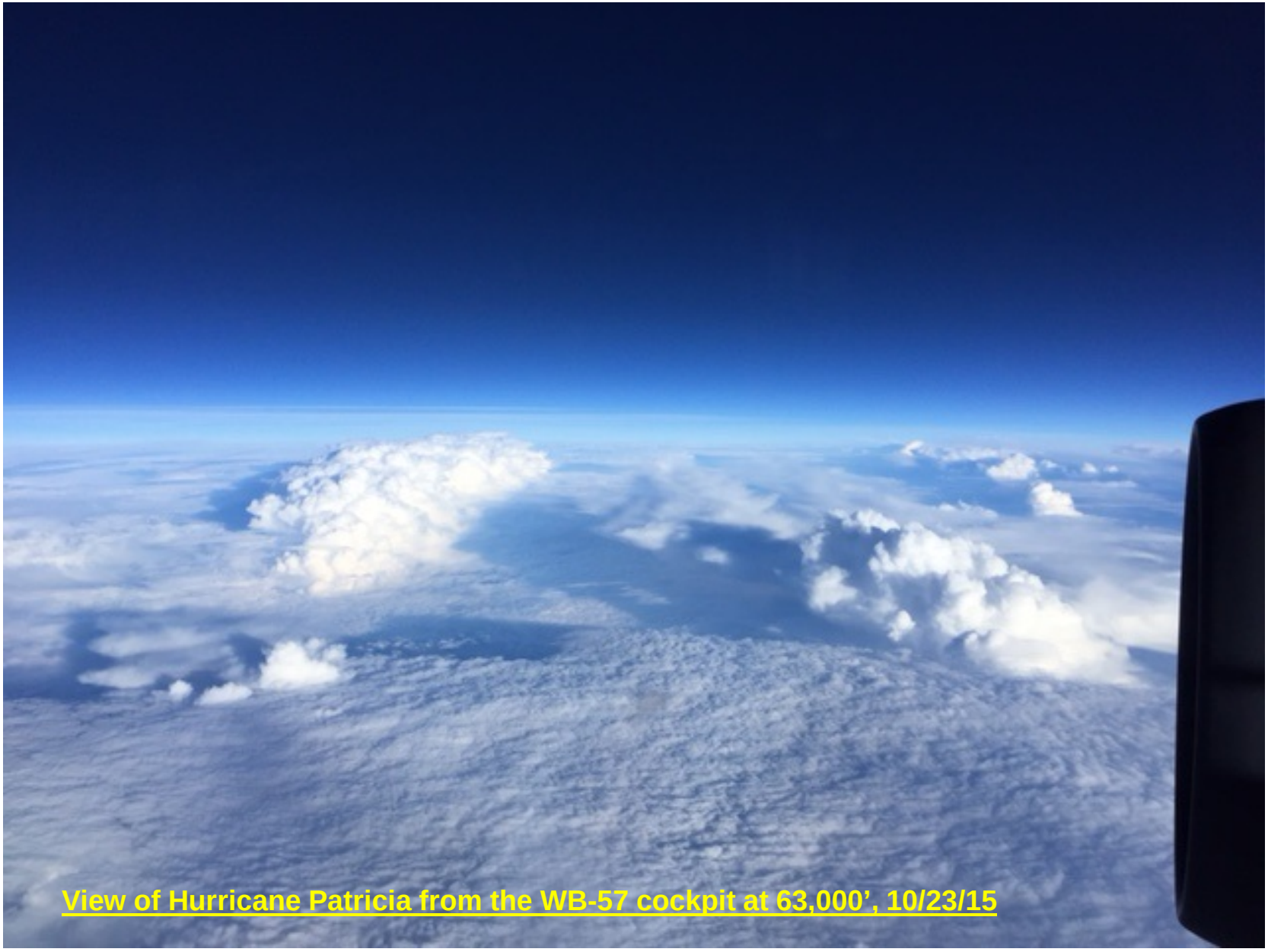
Some Necessary Attributes of a Successful Transition Process

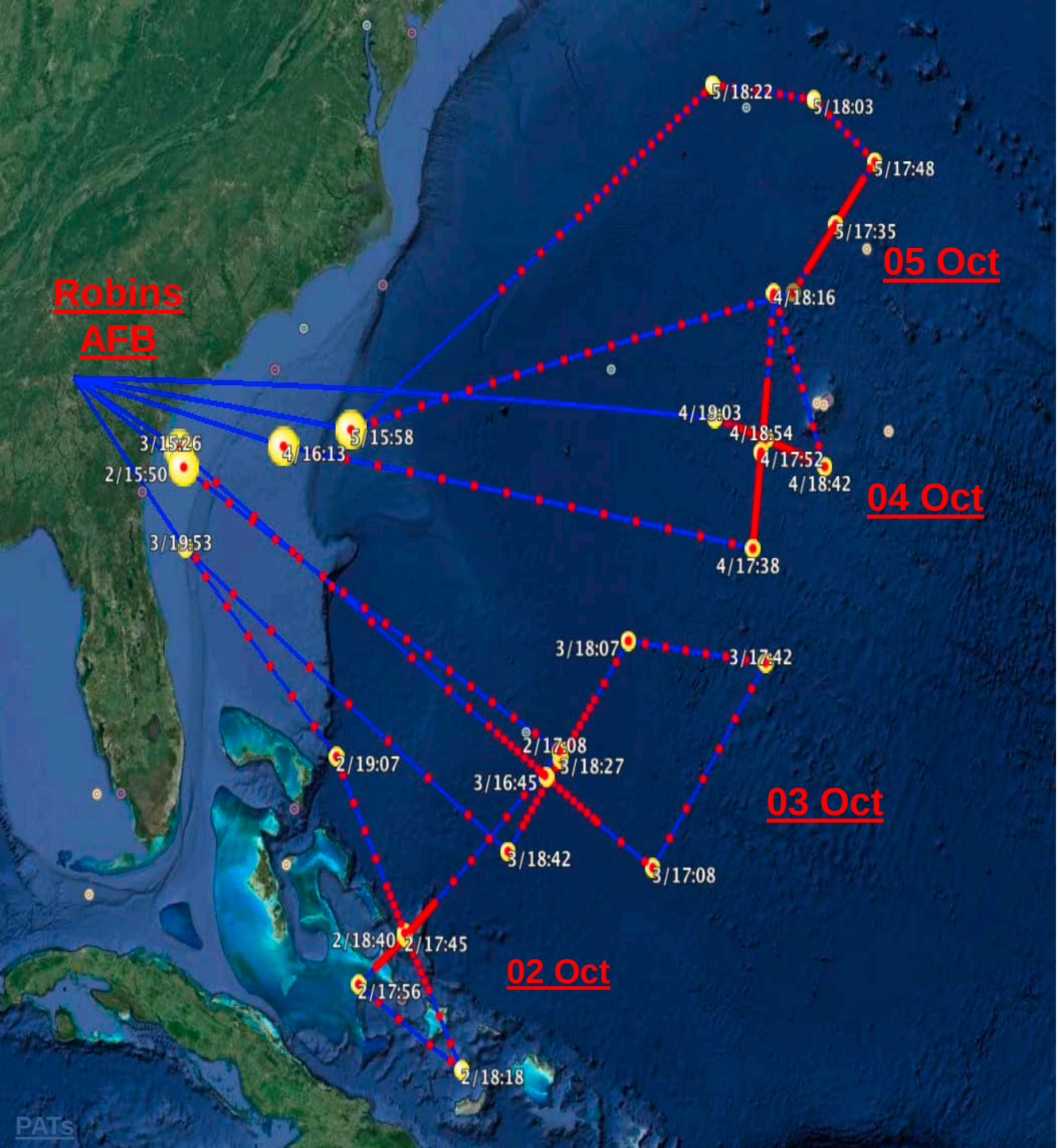
1. **Independent source of funds, sufficient for completion of projects**
2. **Independent PM with responsibility for delivering technologies to meet customer requirements (match development to customer priorities)**
3. **Clearly defined and communicated roles and responsibilities**
4. **A technically proficient community of developers**
5. **Transparent, objective criteria for evaluation of technologies at all stages (TRL's)**
6. **Clear criteria for Milestone Decisions**
7. **Planning Process, community-wide participation, common language and definitions**
8. **Planning and resourcing for upgrades, fixes, etc.**
9. **Appropriate reviews (technical, programmatic, financial, etc.)**

Basic Research to Operations: Examples

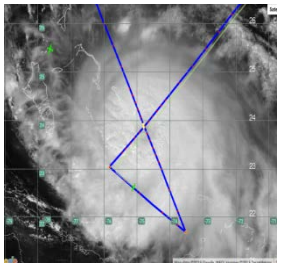


Some Unprecedented Results from TCI

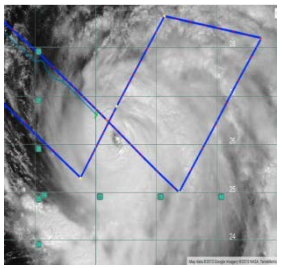




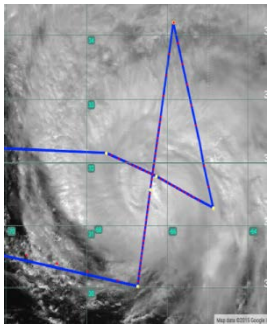
TCI-WB57 Flights into Hurricane Joaquin 11L 2015



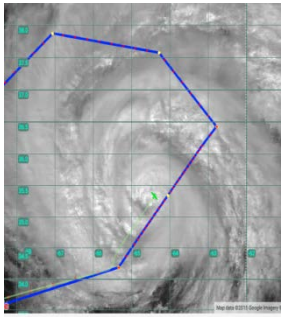
02/15z



03/15z

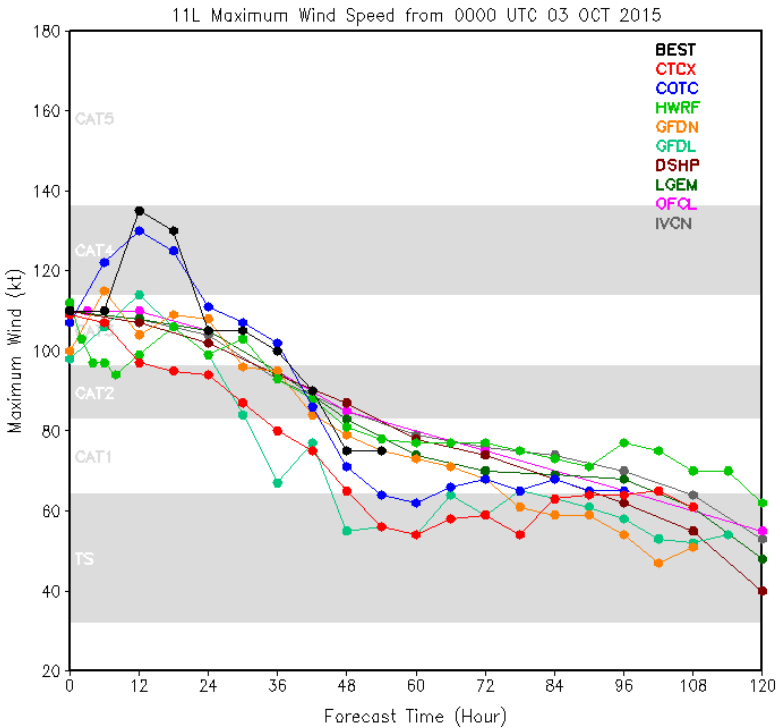


04/15z



05/15z

View of Joaquin's eye from the belly camera



Historic accomplishments:

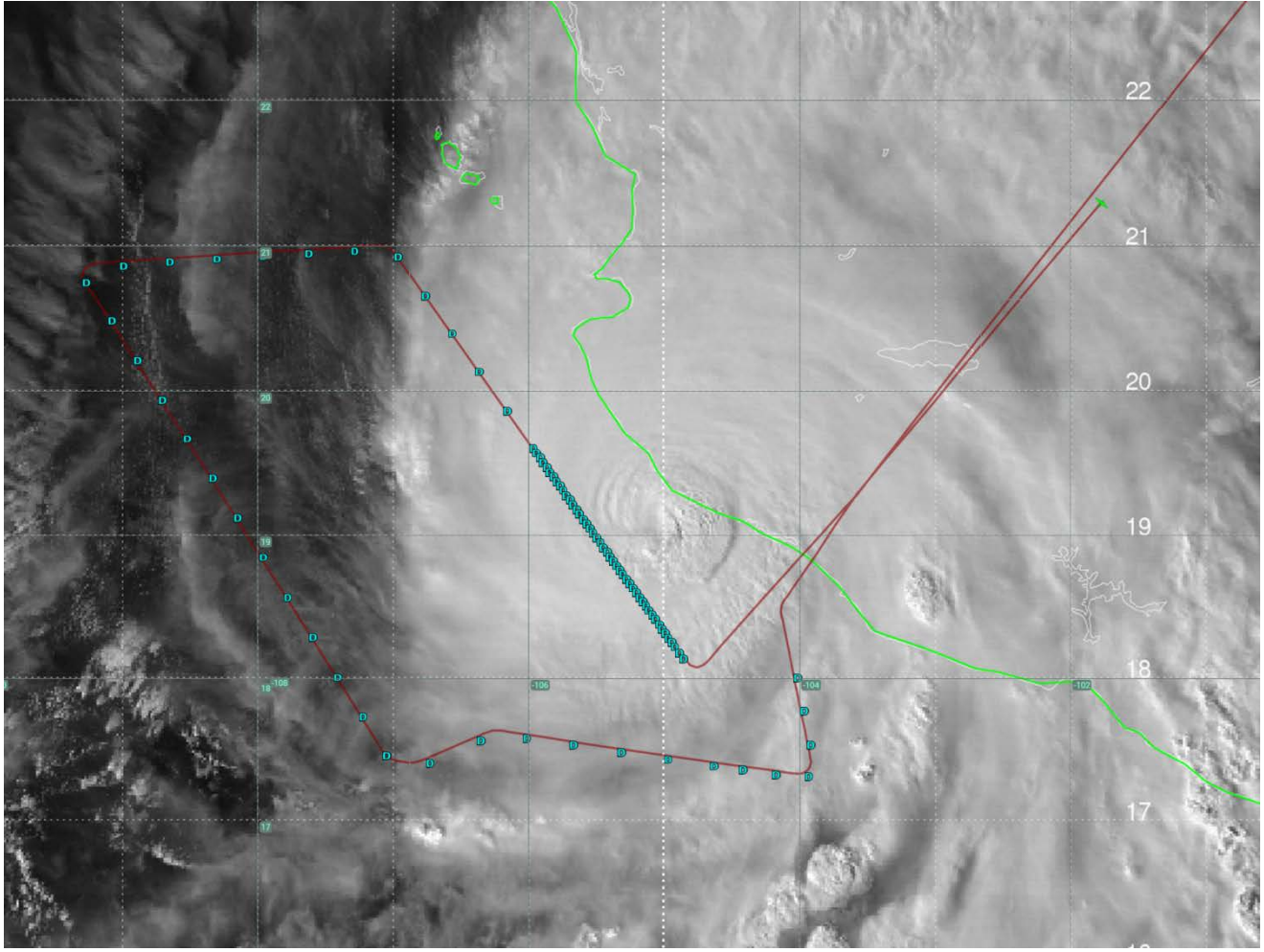
- Most detailed set of tropical cyclone observations (including outflow, eyewall, eye, inflow) ever collected

- Obs. from 62,000 feet captured the entire structure of the storm for the first time

- 4-day sequence documented poorly predicted processes and their evolution over time

- Observations were used in near-real time by the National Hurricane Center to refine official warnings

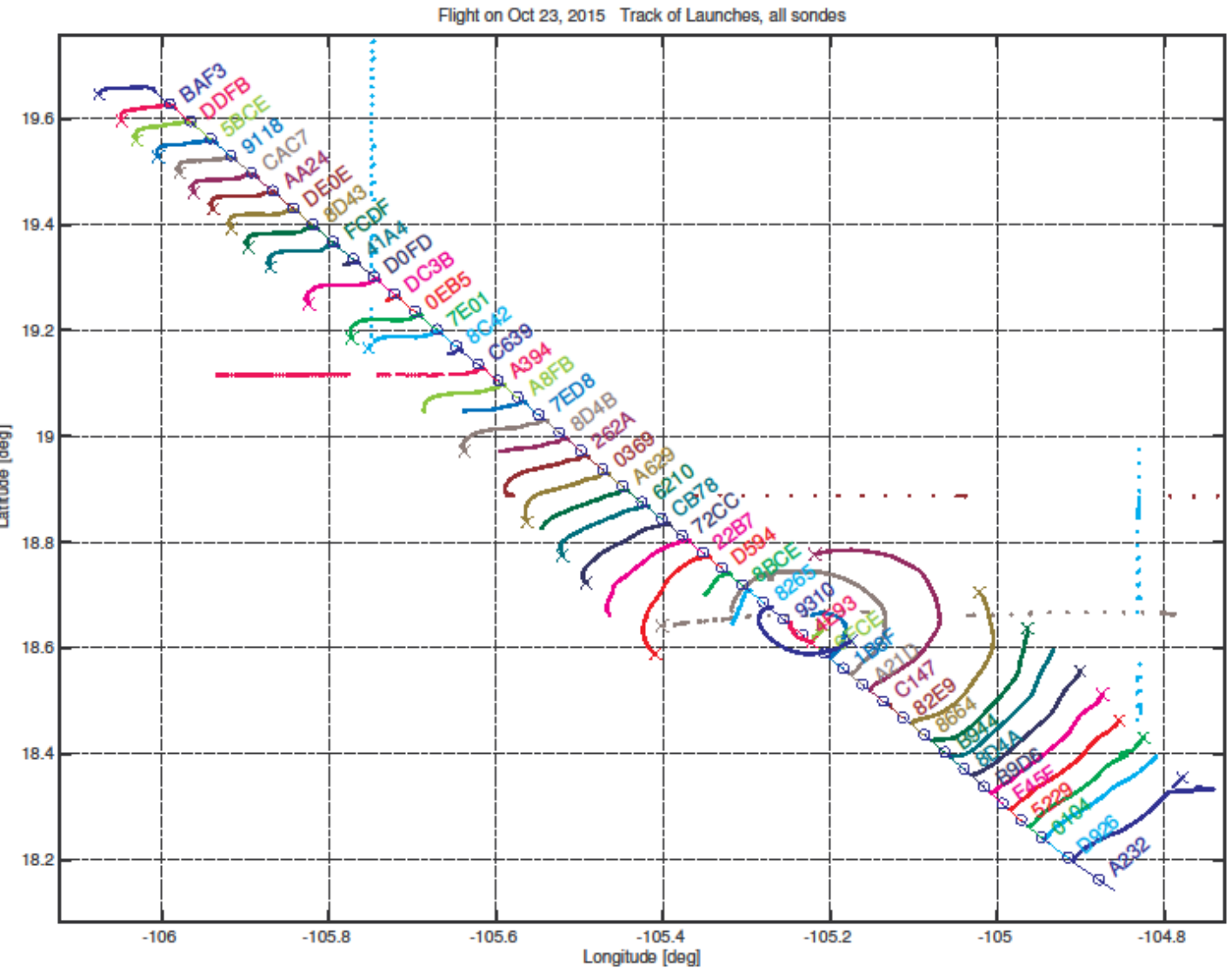
- COAMPS-TC (blue dots) captured the unexpected intensification to Category 4



TCI Observations over Hurricane Patricia, 23 October, 2015

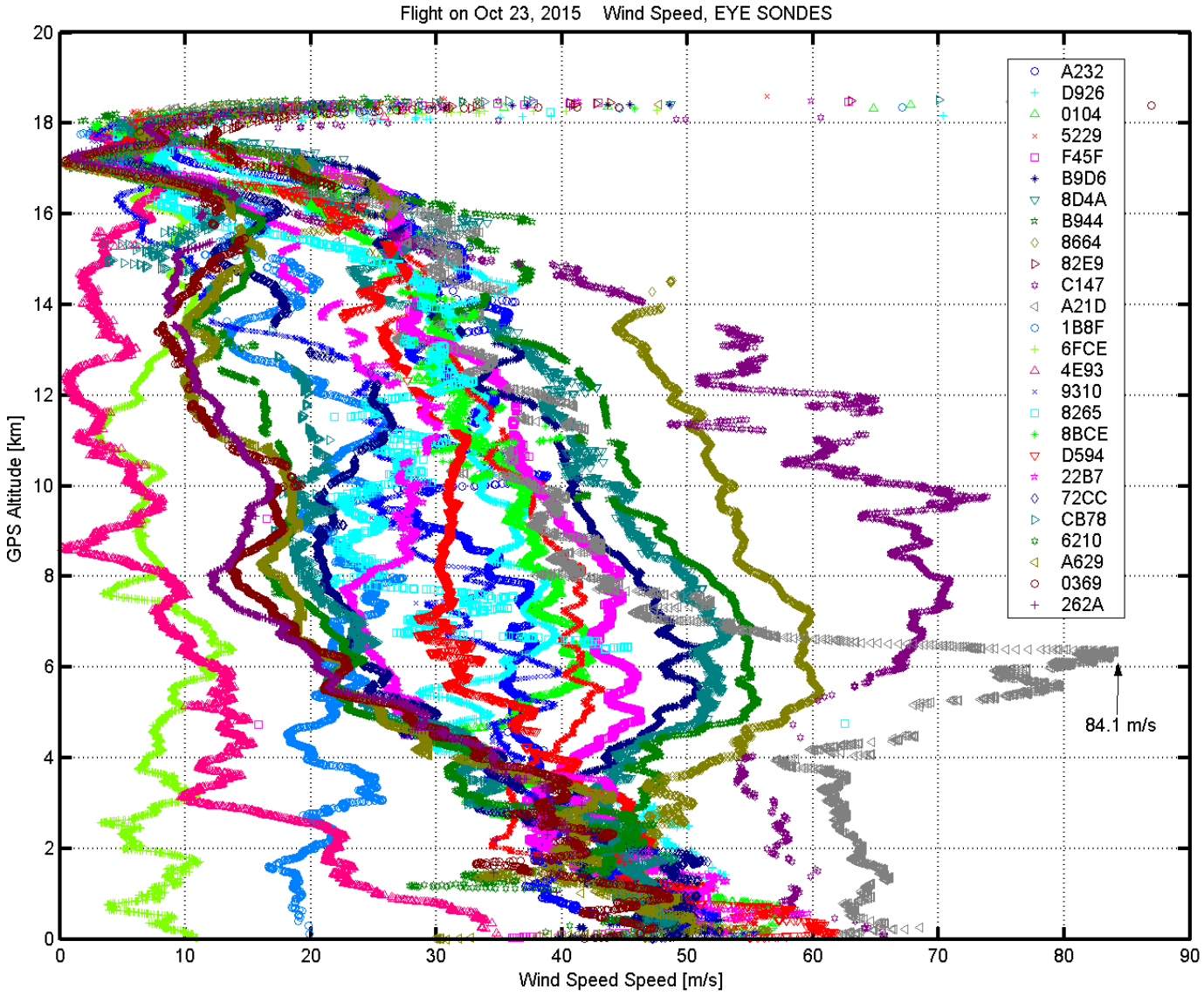
- 46 high-definition dropsonde sequence (green dots) over the eye of Hurricane Patricia 5-6 hours before landfall; most detailed observations ever collected
- Strongest hurricane ever observed (Category 5) was very poorly predicted by current operational models
  - 48-hr forecast was for Cat 1

Sonde trajectories during eye crossing



- **Some sondes in the NW eyewall did not return complete profiles**
- **Two sondes in the SE eyewall made almost 180 degree transits around the storm during their ~15 min fall time**

Corresponding wind profiles for sondes during eyewall crossing



- **max. windspeed of 84 m/sec (168 kts) observed in the SE eyewall (grey dots)**
- **the detailed local variations from between profiles have never been observed before**
- **Planning for research flights on Erika, Joachin, and Patricia was difficult given the generally poor forecasts**