

TCORF Brief

15 March 2016

Tropical Cyclone Operations: Challenges in 2015; New products and services planned for 2016 and 2017



WP-3:

Presenter:
Jim McFadden
AOC Programs Office



Office of Marine and Aviation Operations

AGENDA

- **Challenges to 2015 Operations**
- **2016 Plans and Upgrades - P-3 Service Life Extension Status**
- **2017 Plans and Challenges**



FY15 Aircraft Allocation Plan - January 20, 2015

	Aircraft Services Base Hours	Program Hours	Reimbursable Hours	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
P-3 N42RF	129 Hrs	70 Hrs		Arctic Flux 70 P Hrs	Hurr. Ops / Resch. 34 Base Hrs		Ocean Winds Winter 95 Base Hrs.								
N43RF	560 Hrs	8 Hrs		Hurr. Ops / Resch. 34 Base	Comma Upgrade/Phase		CALWATER 2 77 B/3 Prog. Hrs		SONG-NEX 115 B/5 Prog. Hrs		3.5 Eng. Install	PECAN* 87 Base Hrs.	Hurricane Ops&Research (cont.)/ Ocean Winds 172/70 + 5 Base Hrs.		
G-IV N49RF	330 Hrs	4 Hrs		Hurricane Surveillance/Research 72 Base Hrs.	Upgrade		CALWATER 2 86 B/4 Prog. Hrs		Ops Maint.	HAT 128			Hurricane Surveillance/Research 145 + 14 Base Hrs.		
Twin Otter N46RF	611 Hrs	65 Hrs		Snow Survey / Water Res.	NE AMAPPS 120 Base Hrs.		Snow Survey / Water Res. 475 + 16 Base Hrs.							Harb Seal 65 P H	
N48RF	275 Hrs	315 Hrs		Coastal Mapping 100 Base Hours		SERW 300 Prog Hrs				Fugitive Emission 129 B/11 Prog. Hrs		Plankton 46B/4P	Snow Survey (cont.)		
N56RF	352 Hrs	172 Hrs		Corrosion/Upgrades		NE AMAPPS (cont)	SE AMAPPS 120 Base Hours		Coastal Mapping 150 + 24 Base Hours			Stellar Sea Lion 58B/22P	LOSI	Harbor Seals 150 Program Hours	
N57RF		605 Hrs	208 Hrs		NERW			Corrosion		NERW 605 P Hrs	NERW	NERW	NERW	NERW	NERW
King Air N68RF	600 Hrs			Coastal Mapping/Em. Response 450/150 Base Hours	Paint		Coastal Mapping/Em. Response (cont.)								
Jet Prop N45RF	575 Hrs	200 Hrs					Snow Survey / Water Resources 560 + 15 Base Hours		Paint				GRAV-D 200 Prog Hrs		
UAS Puma 0481				SEGO					SEGO	NER		WCR	SEGO	SEGO	TEMM
UAS Puma 0482				WCR				PIR		WCR	WCR	PIR	PIR	PIR	
Quadrocopter															
Subtotal Hours:	3432 Hrs	1439 Hrs	208 Hrs												

NOTES - Flight hours allocated for FY 15 Allocation Plan based on current budget guidance and is subject to change.
Project beginning and end dates subject to change to accommodate instrumentation, transit and maintenance as necessary.
* Aircraft will be available for hurricane tasking, if needed.
Flight hour changes from FY 15 President's Budget AAP highlighted in green

Approved by:

NESDIS _____ Date _____ NMFS _____ Date _____ NOS _____ Date _____ PPI _____ Date _____
NWS _____ Date _____ OAR _____ Date _____ OMAO _____ Date _____

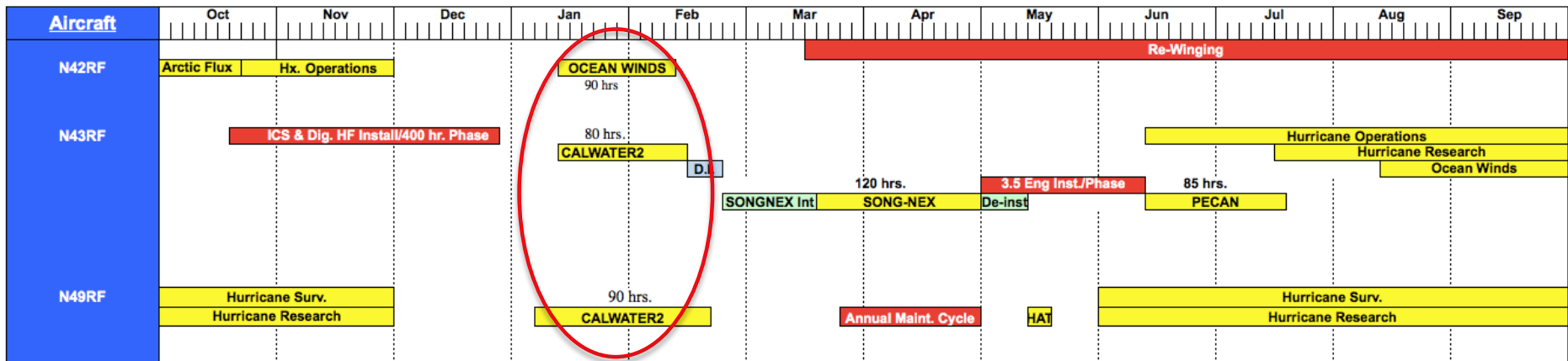
TOTAL	5079 Hrs
Legend:	
Healthy Oceans	
Resilient Coastal Communities and Economies	
Climate Adaptation and Mitigation	
Weather-Ready Nation	
Other	



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FY15 HEAVY AIRCRAFT SCHEDULE

Project Roadmap FY 2015





CalWater 2015

Precipitation, Aerosols, and Pacific
Atmospheric Rivers Experiment

Ryan Spackman, Flight Operations Scientist
Allen White, Mission Scientist
Chris Fairall, Platform Scientist
and
CalWater 2015 Team



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G-IV DRAFT Flight Plan

Take off 18Z Fri. 2/6 (10 am LT), landing approximately 01Z Sat. 2/7 (5 pm LT Fri.)

Leg 0-1, no drops; Leg 1-2, 8 drops; Leg 2-3, no drops; Leg 3-4, 8 drops; Leg 4-5, 8 drops; Leg 5-6, 7 drops. Total drops for flight = 31. May choose to do only one drop at turn from WP2 to WP3 for a total of 30.

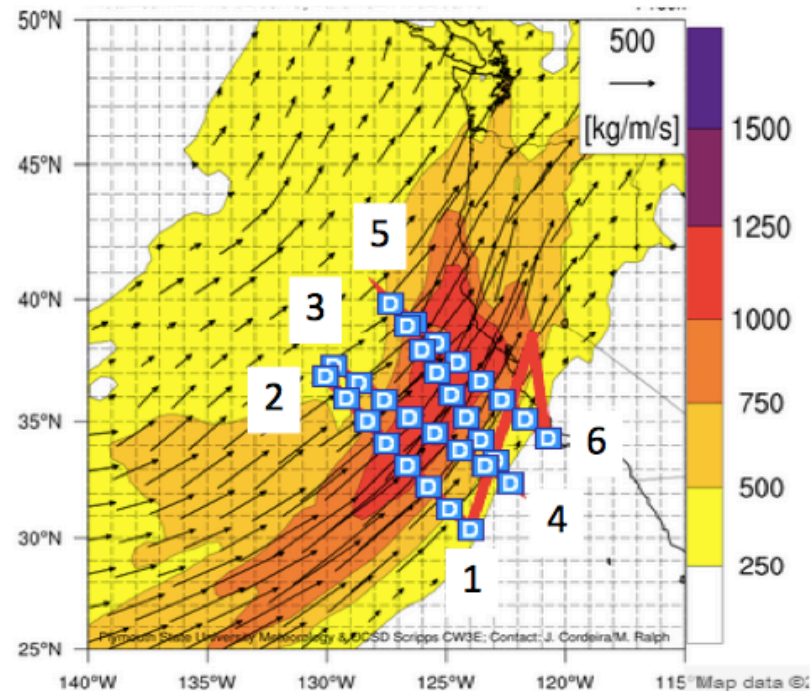
Flight Track Way-Points

WP 1:	30 d	26.4 m N	124 d	5.4 m W
WP 2:	36 d	55.6 m N	130 d	11.3 m W
WP 3:	37 d	22.8 m N	129 d	49.1 m W
WP 4:	32 d	28.8 m N	122 d	25.8 m W
WP 5:	39 d	51.6 m	127 d	24.0 m W
WP 6:	34 d	24.6 m N	120 d	53.4 m W

Darren Jackson
Platform Scientist

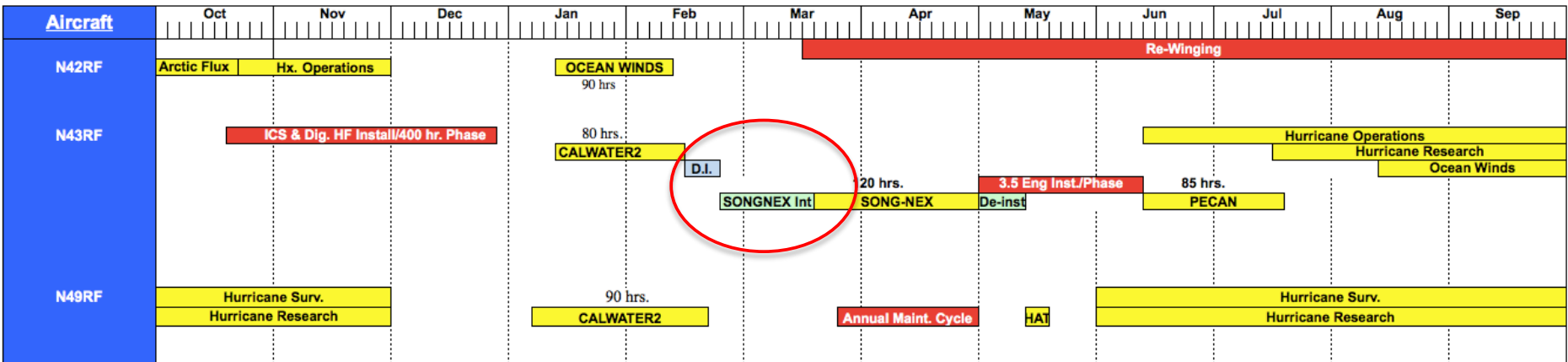
Coordinates for NOTAM Box

Near WP 1: 28 d N, 124 d W
Near WP 2: 37 d N, 133 d W
Near WP 5: 42 d N, 128 d W
Near WP 6: 35 d N, 118 d W



FY15 HEAVY AIRCRAFT SCHEDULE

Project Roadmap FY 2015



Possible N43RF Payload- SONGNEX 2015

NOAA-CSD version 6 12-29-2014

Operator seats:

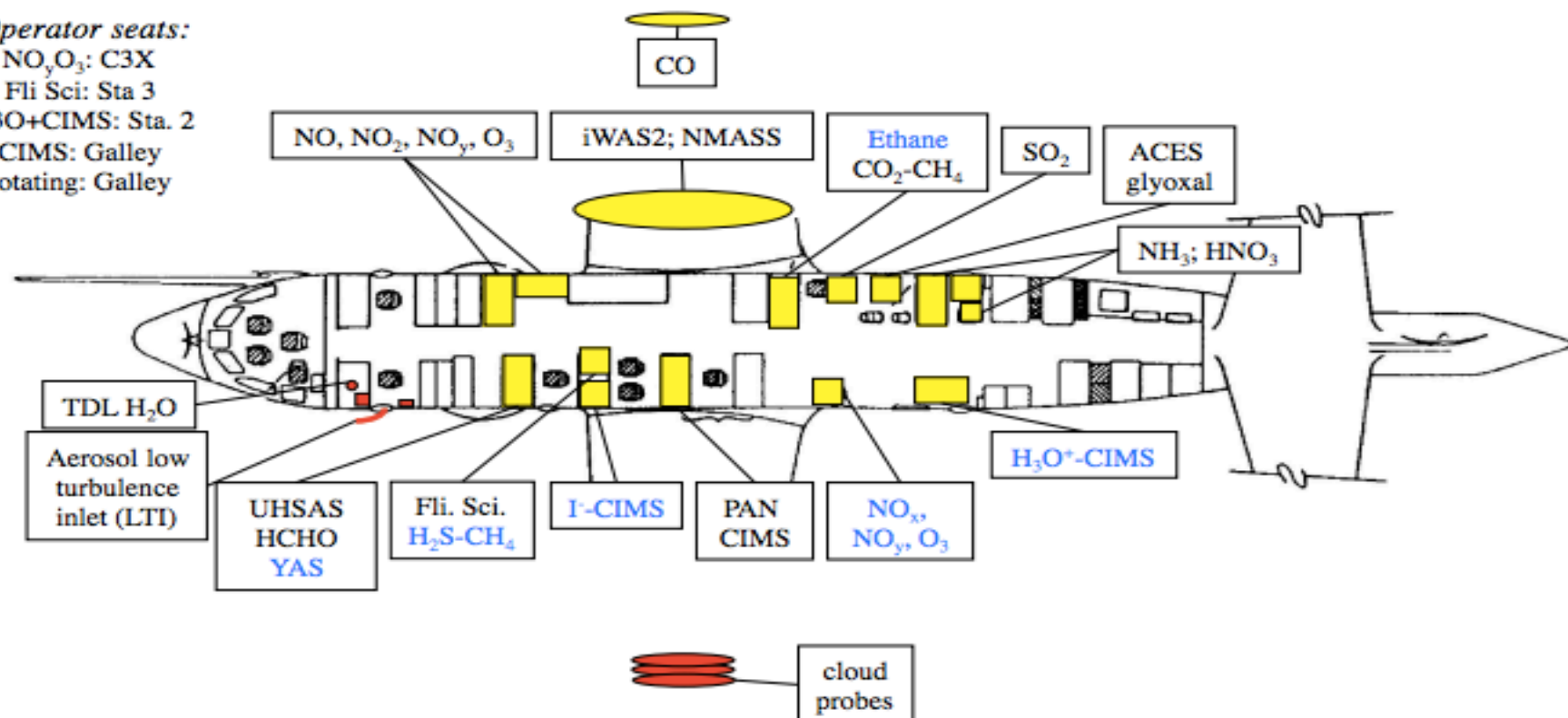
NO_yO_3 ; C3X

Fli Sci: Sta 3

H_3O^+ -CIMS: Sta. 2

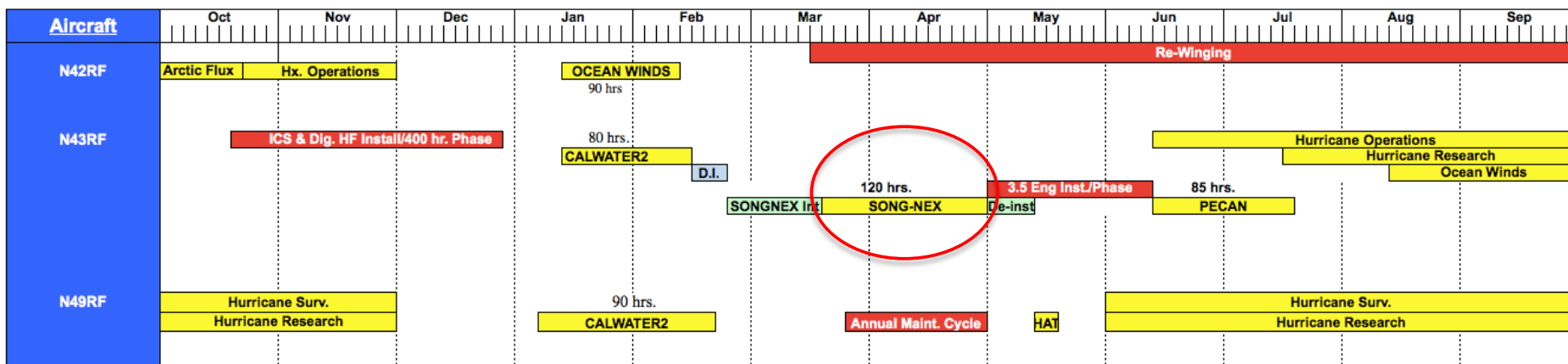
CIMS: Galley

rotating: Galley



FY15 HEAVY AIRCRAFT SCHEDULE

Project Roadmap FY 2015

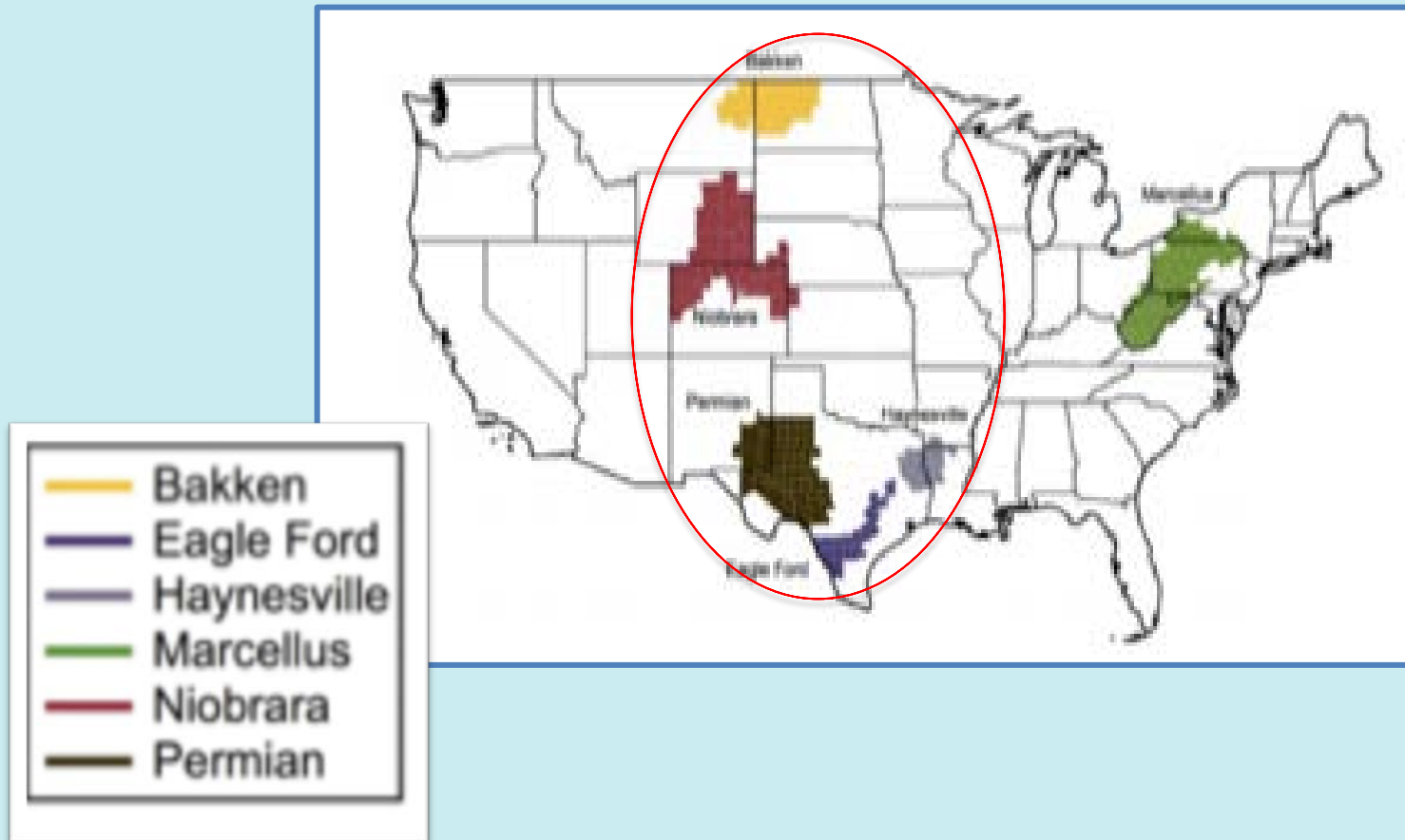


SONGNEX 2015

Shale Oil and Natural Gas Nexus

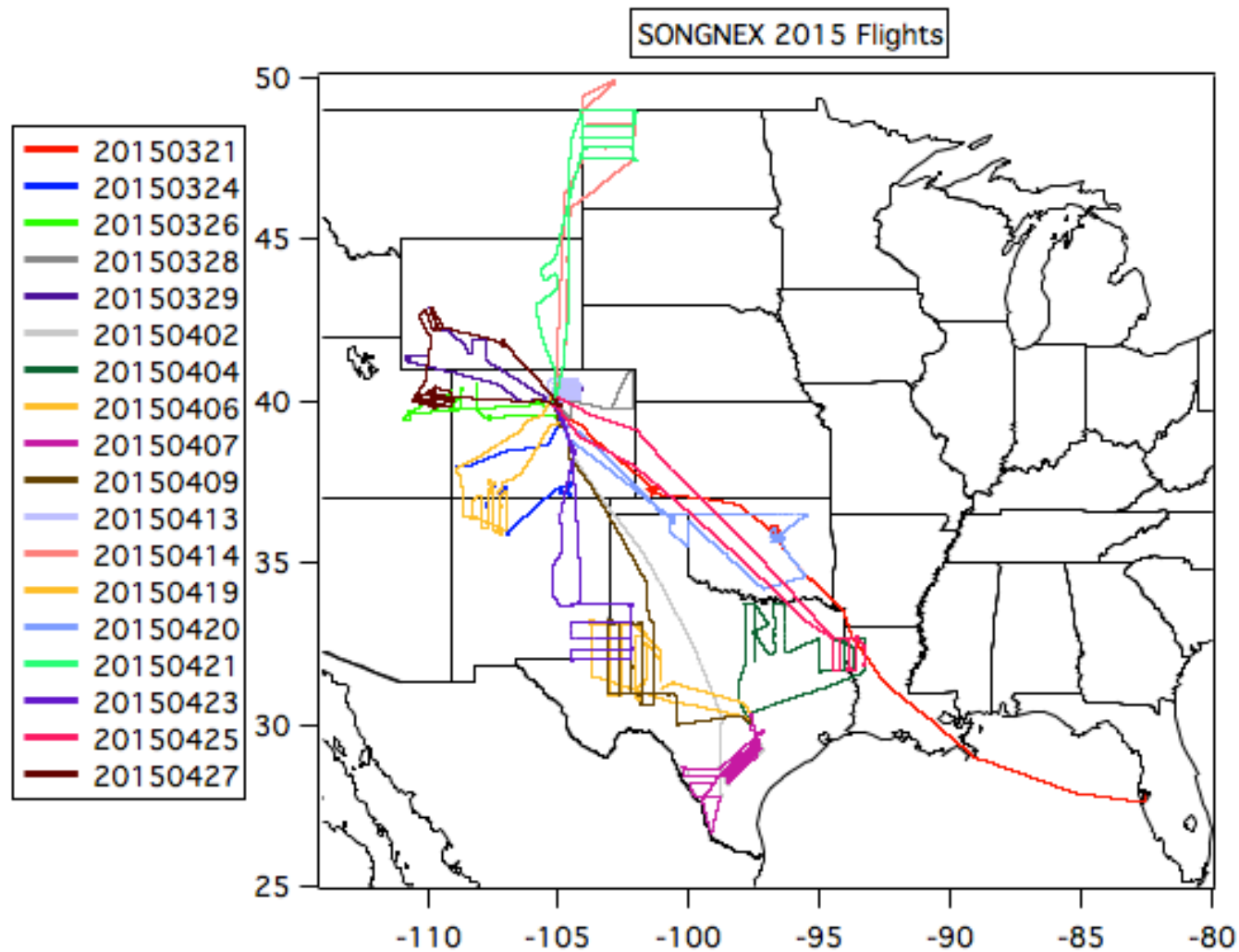
Studying the Atmospheric Effects of Changing Energy
Use in the U.S. at the Nexus of Air Quality and
Climate Change





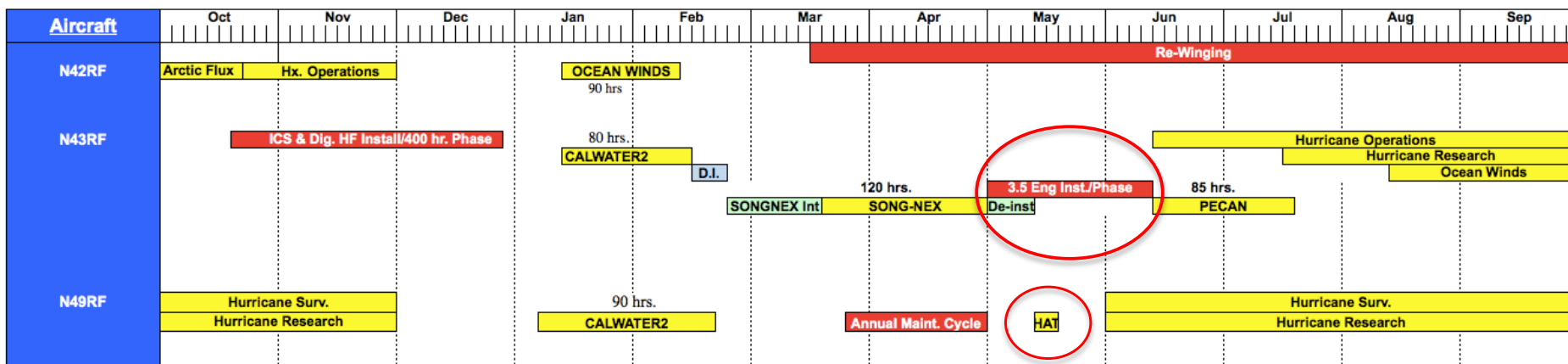
Key Tight Oil and Shale Gas Regions in the U.W.

WP-3D Flight Tracks



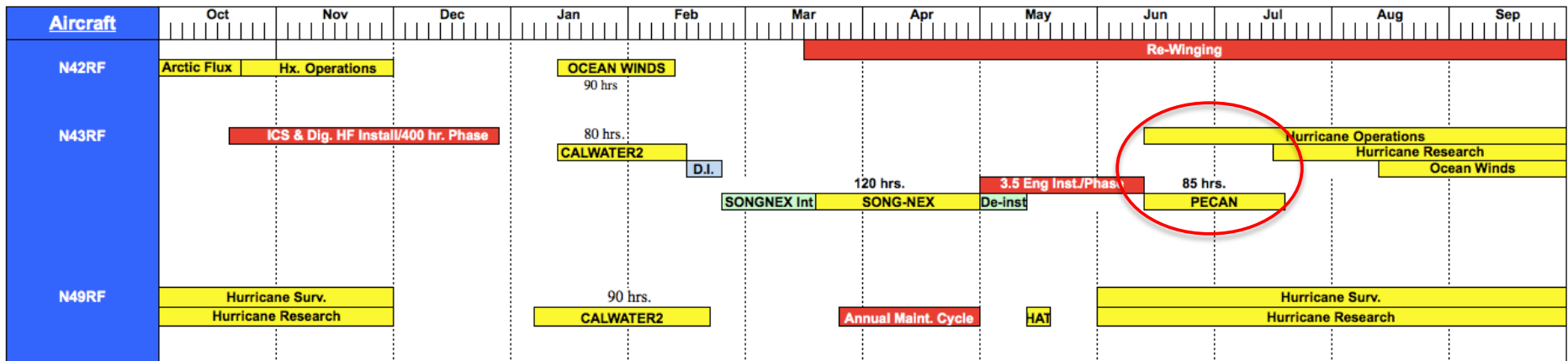
FY15 HEAVY AIRCRAFT SCHEDULE

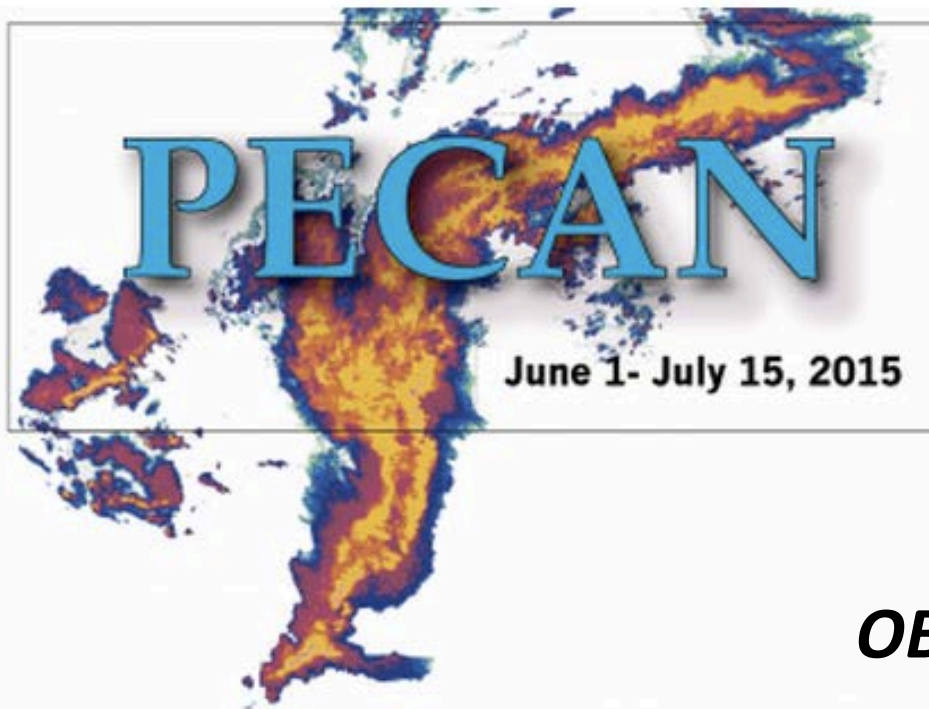
Project Roadmap FY 2015



FY15 HEAVY AIRCRAFT SCHEDULE

Project Roadmap FY 2015





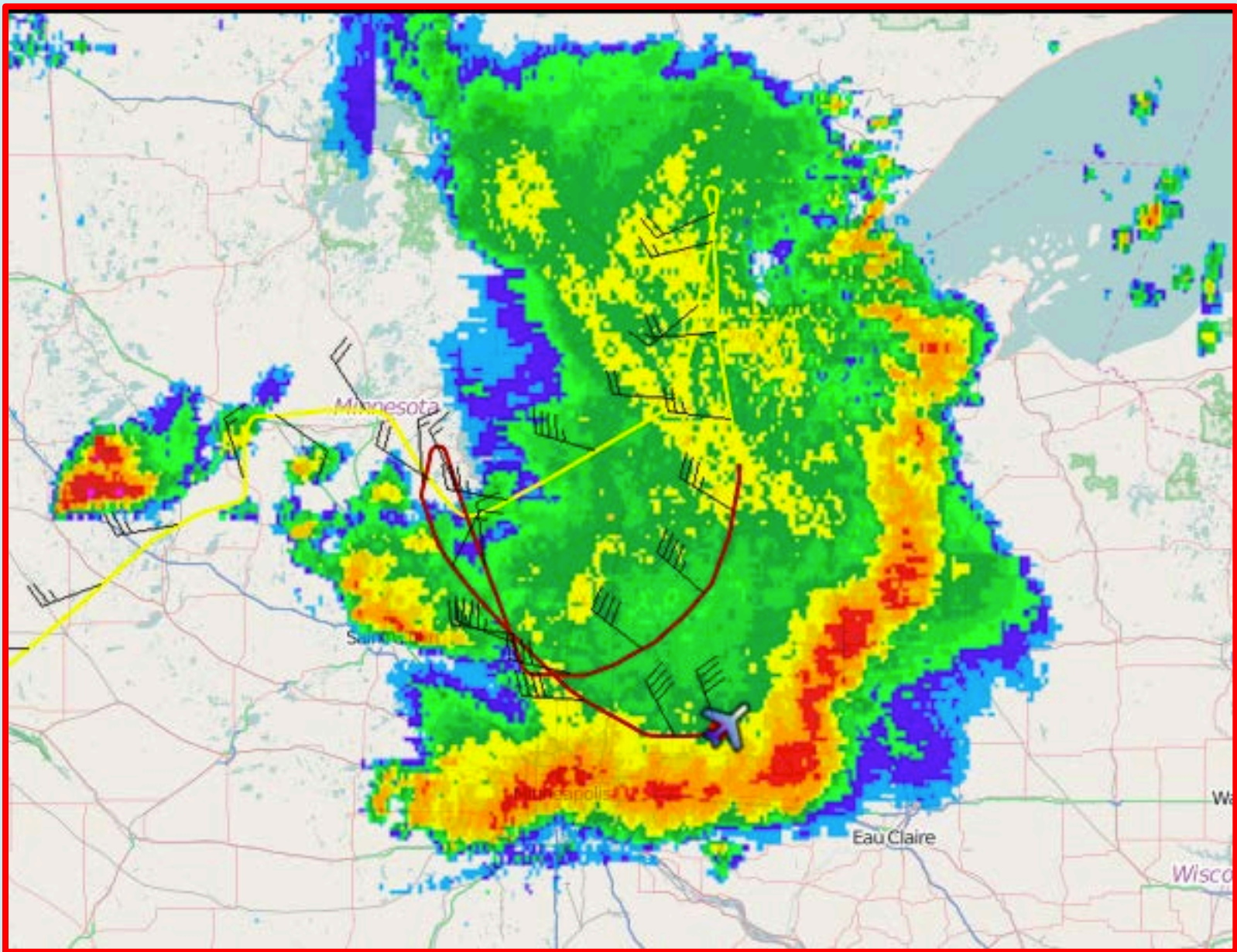
Plains Elevated Convection at Night

OBJECTIVES

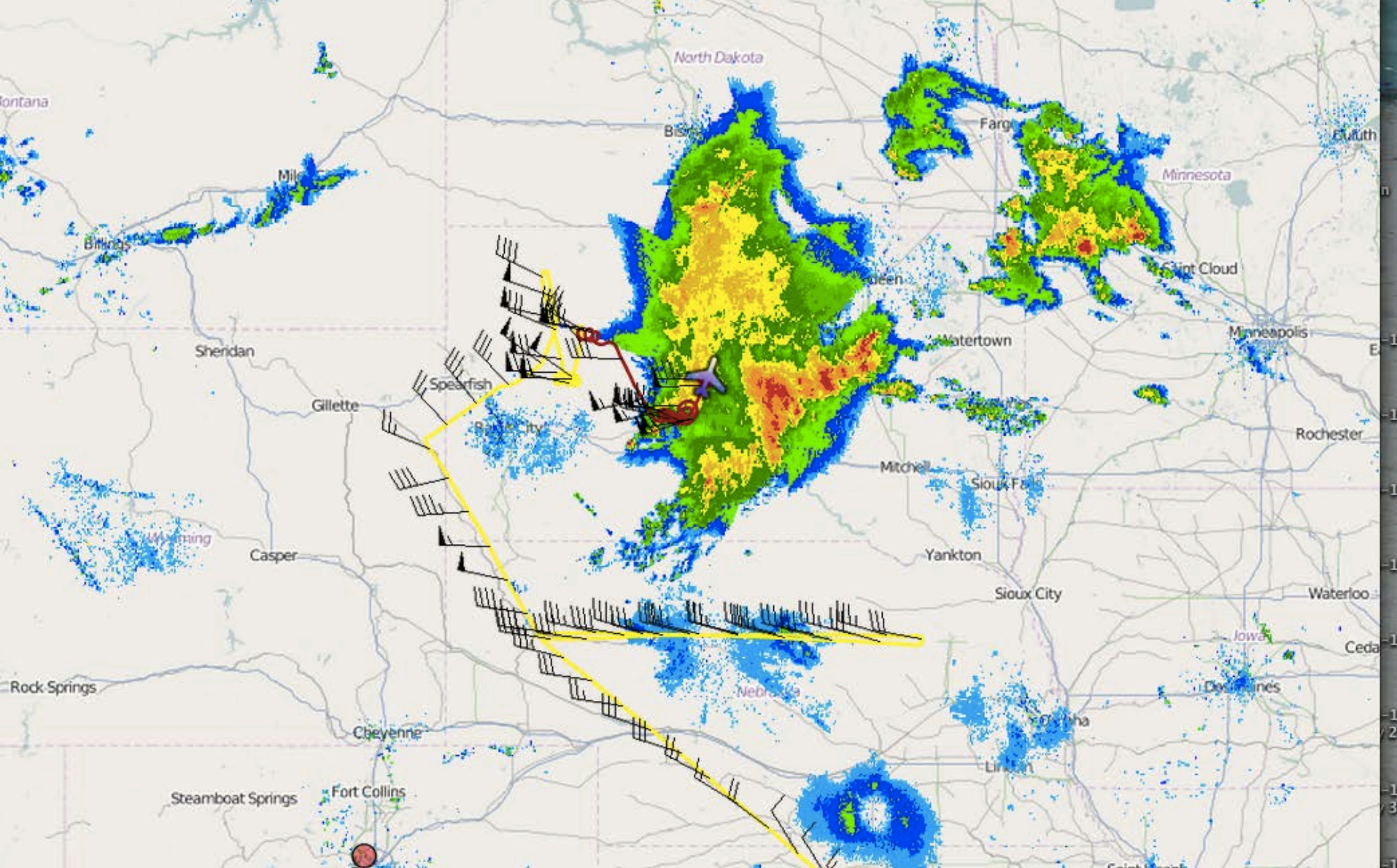
1. Initiation and early evolution of elevated convection
2. MCS internal structure and microphysics.
3. Bores and wave-like features



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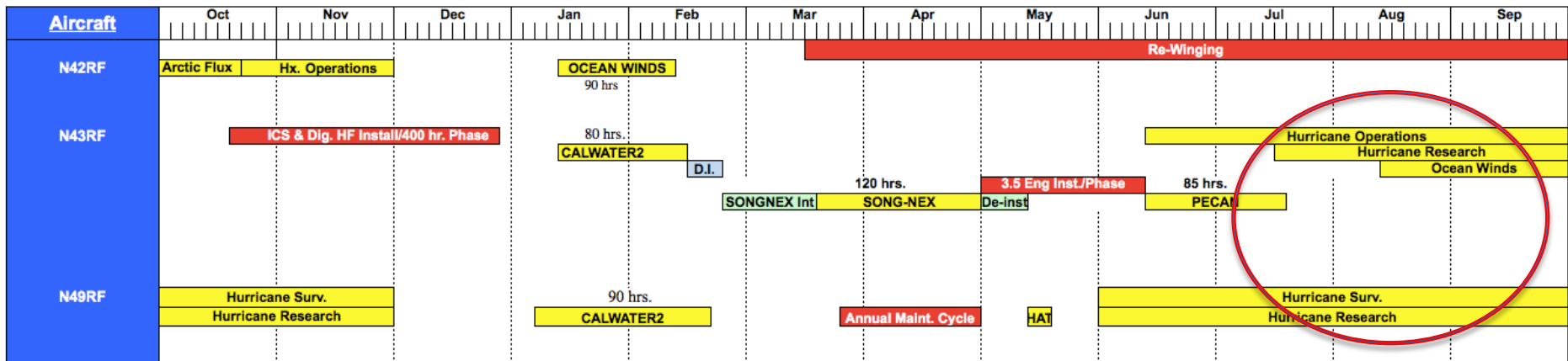
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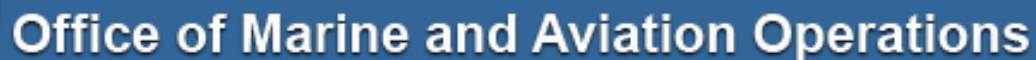
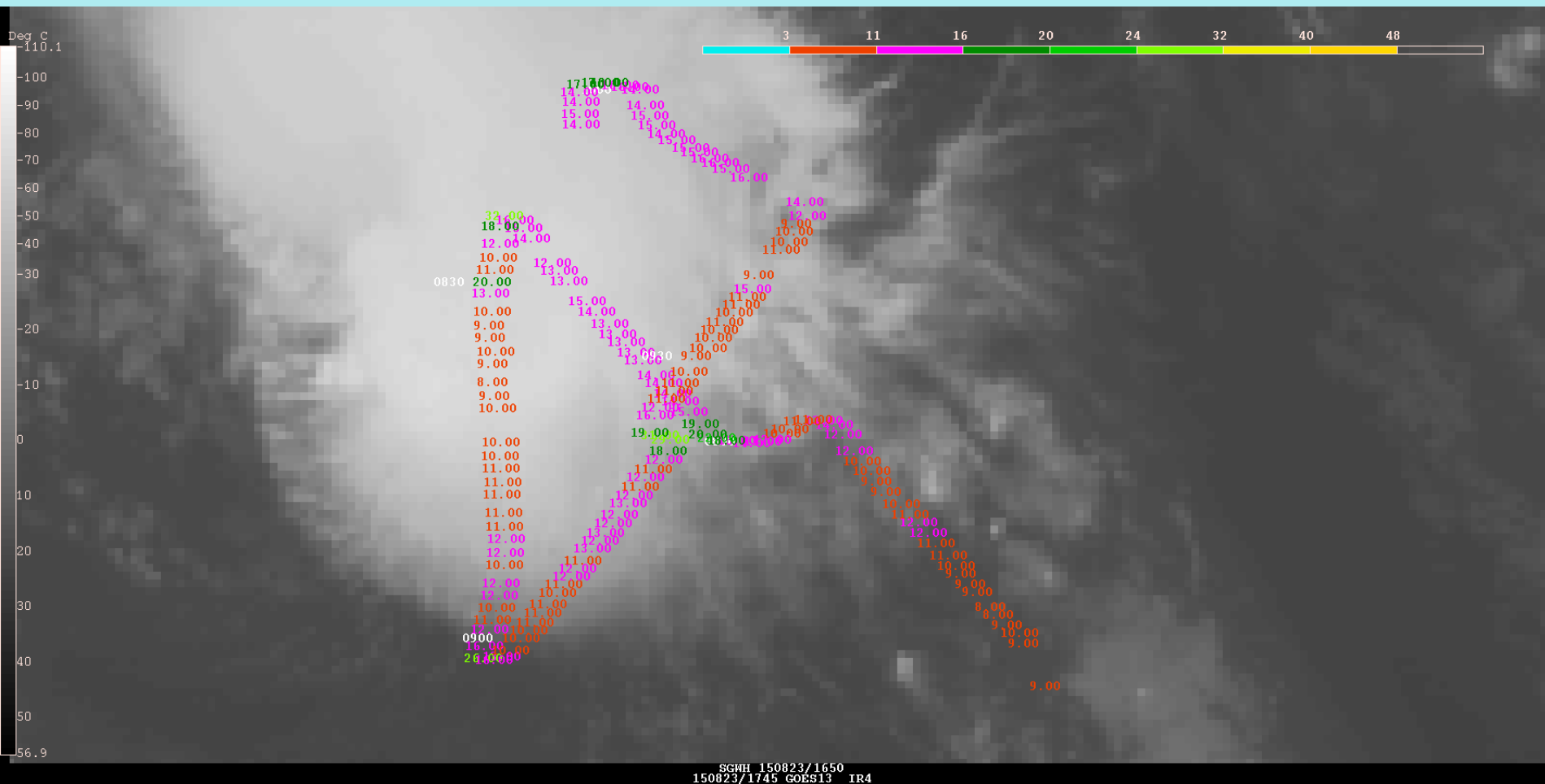


2015 Hurricane Season Highlights

- Started Late – Ended Late
- Only one P-3 plus the G-IV available for season
- 160 fewer hours flown in 2015: 300 vs. 460
- Flew missions in the Atlantic, E.Pac and Central Pacific
- **For Danny and Erika, flew 17 missions over 8 days out of Barbados**
- WSRA delivered data to NHC; DWL operated w/ limited success



WSRA wave heights in Hurricane Danny

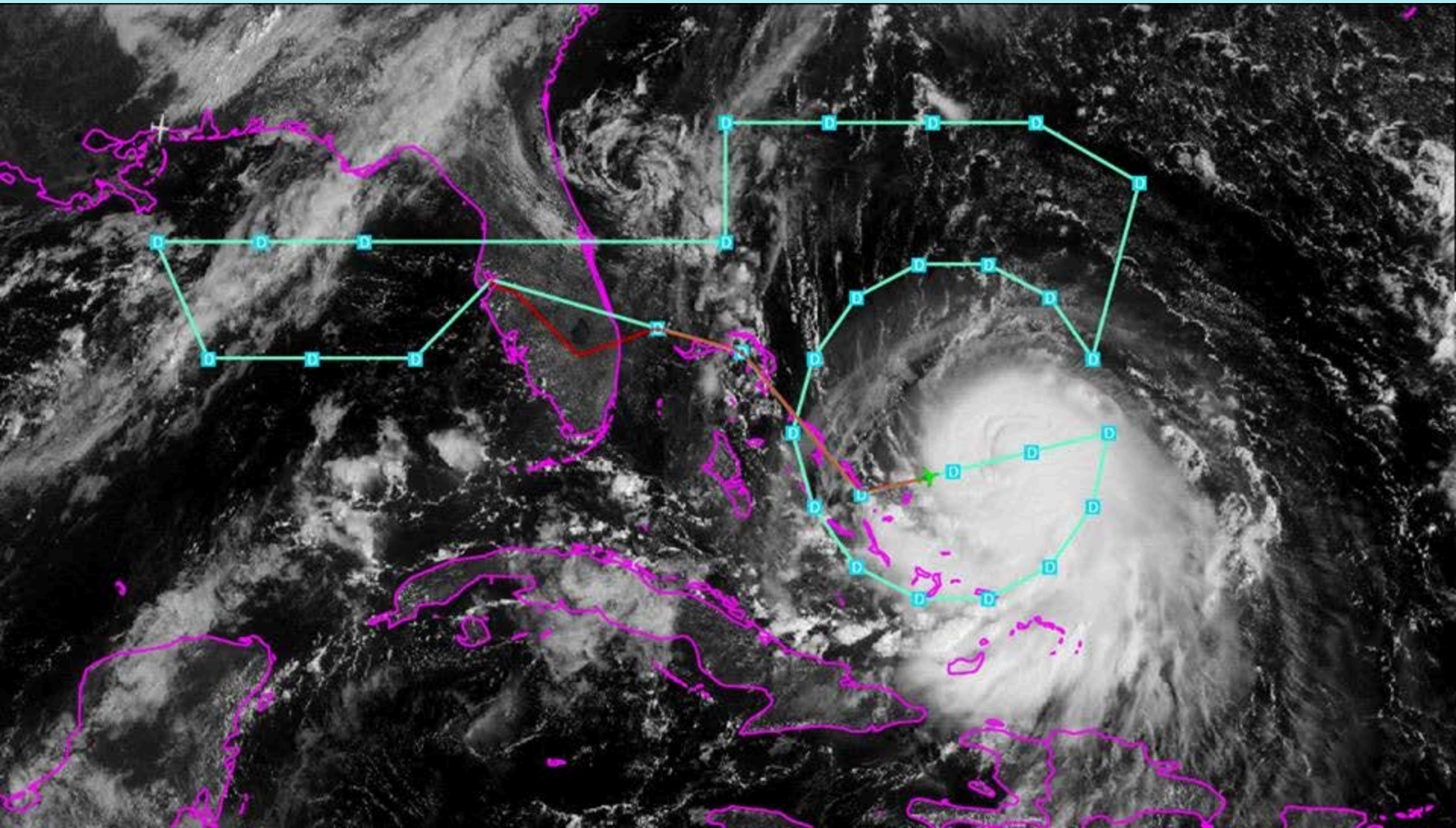


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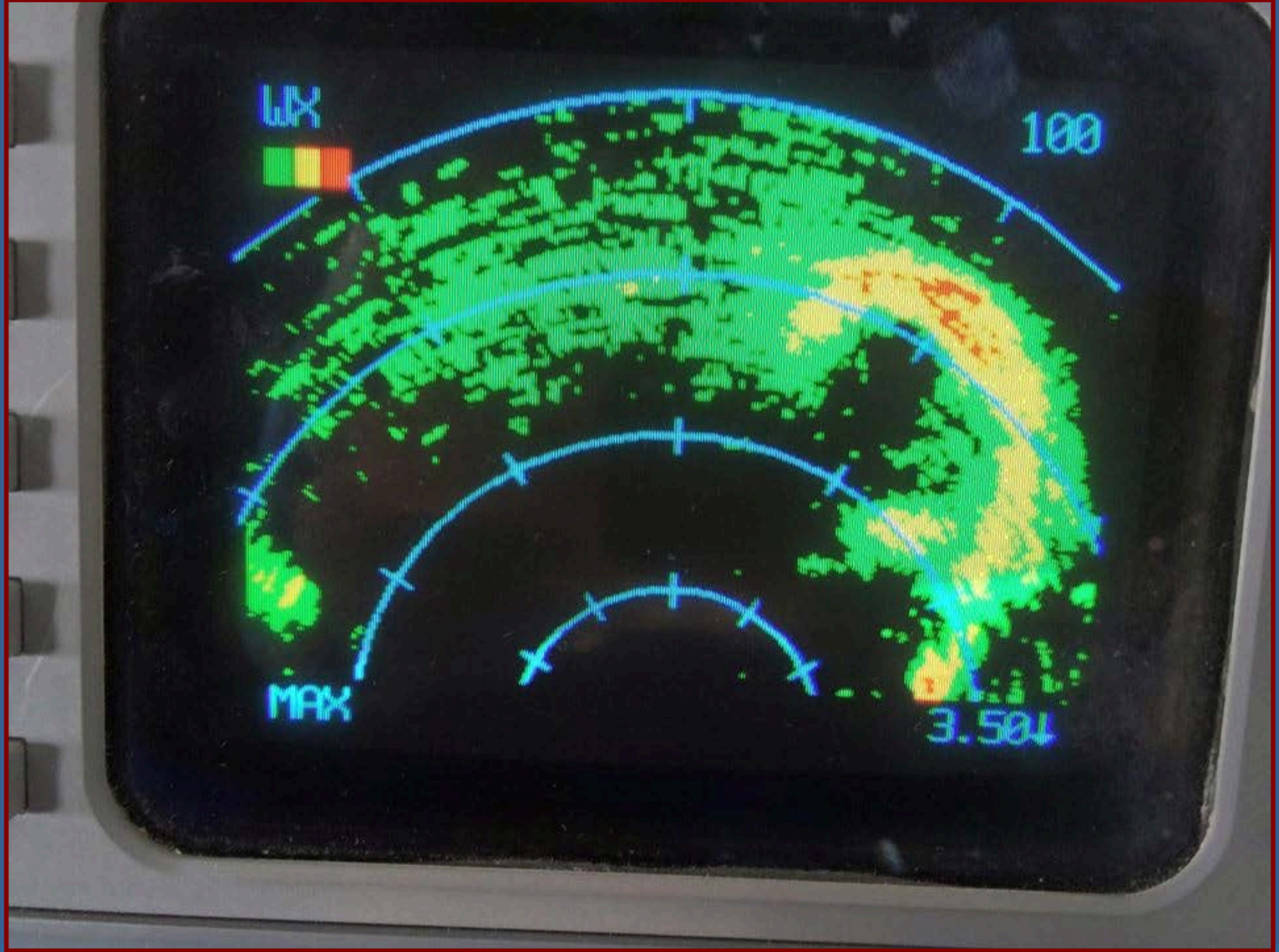
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- **G-IV flew 3 surveillance missions around Joaquin.**



G-IV Surveillance Track around Hurricane Joaquin



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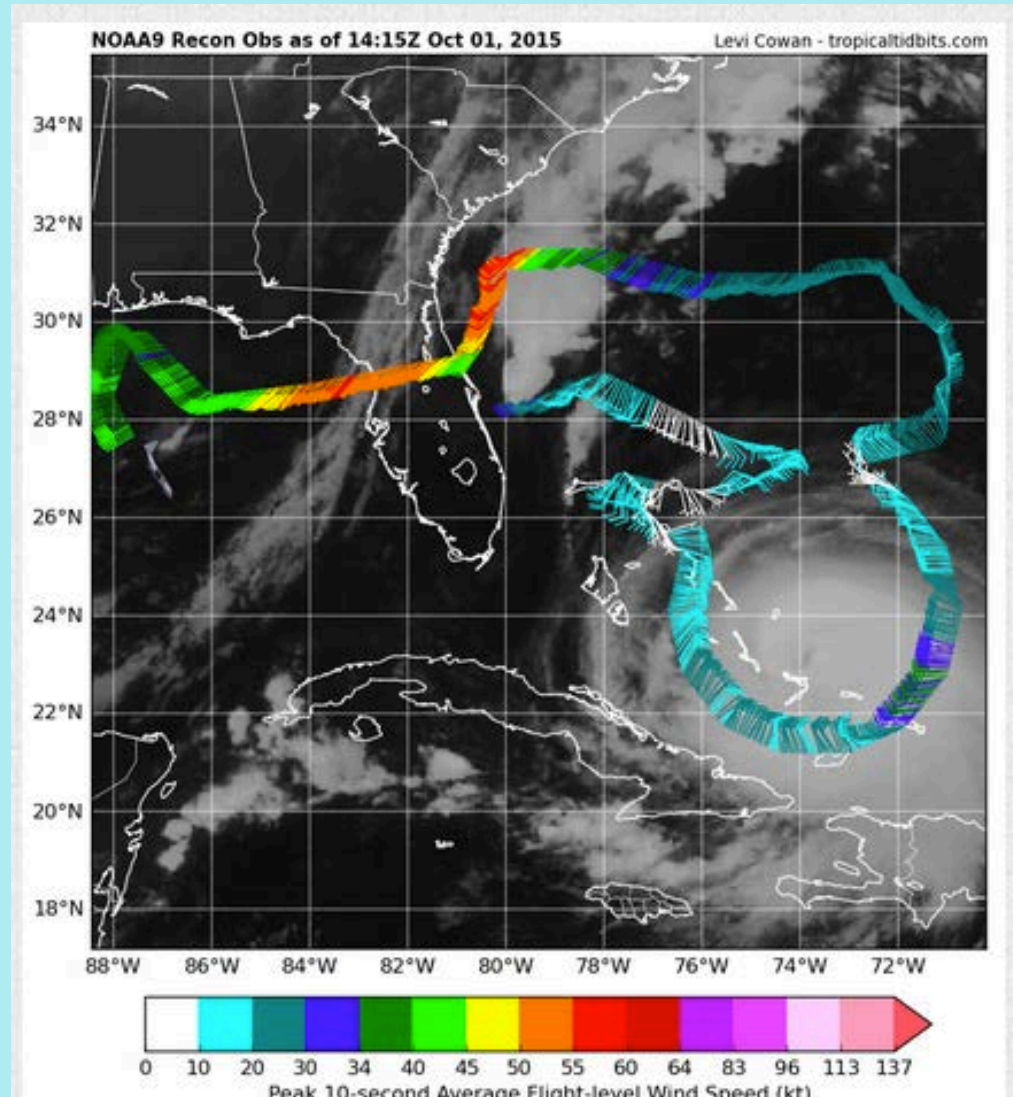
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G-IV Surveillance Track around Hurricane Joaquin



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G-IV Surveillance Track around Hurricane Joaquin



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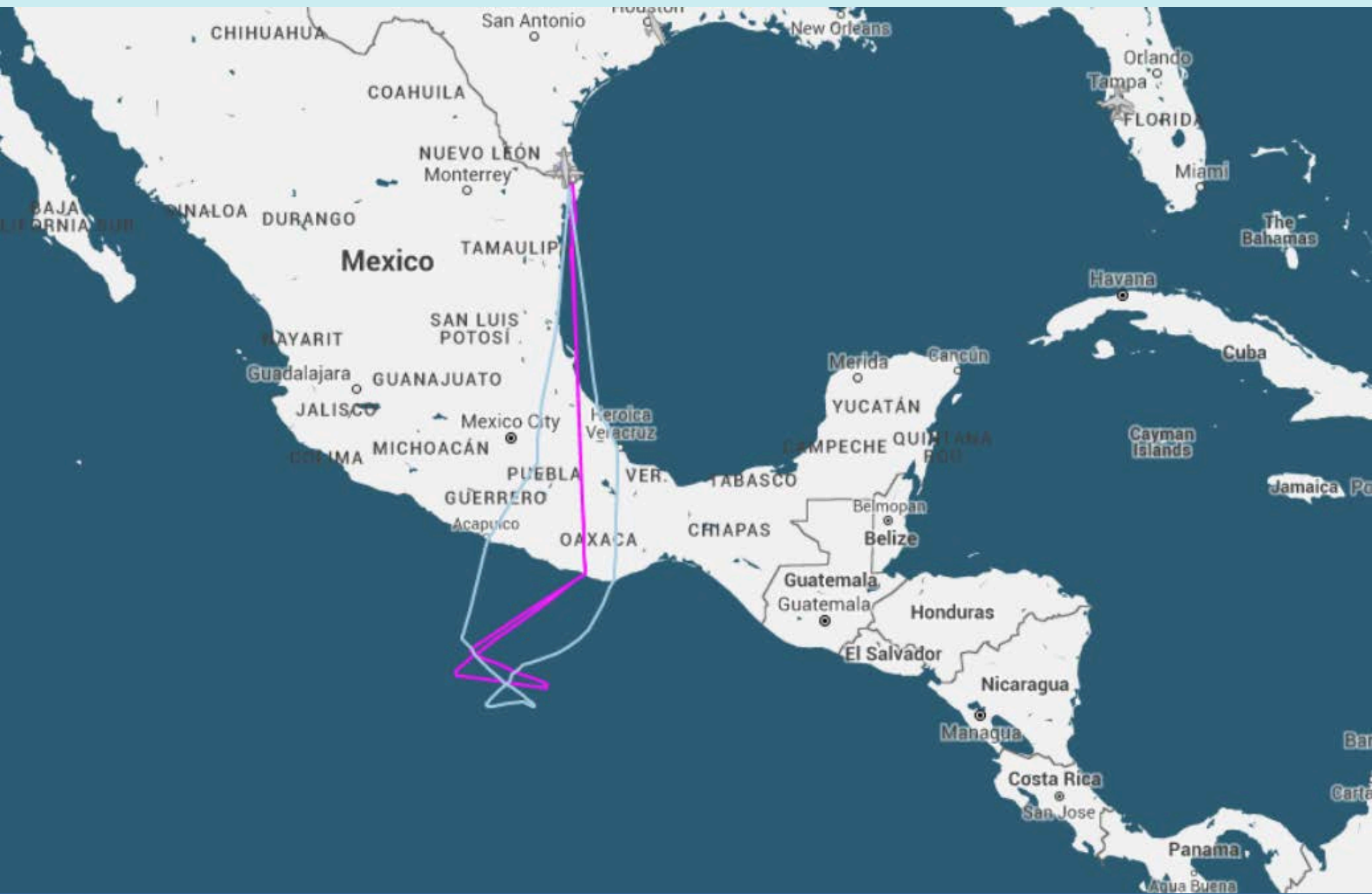


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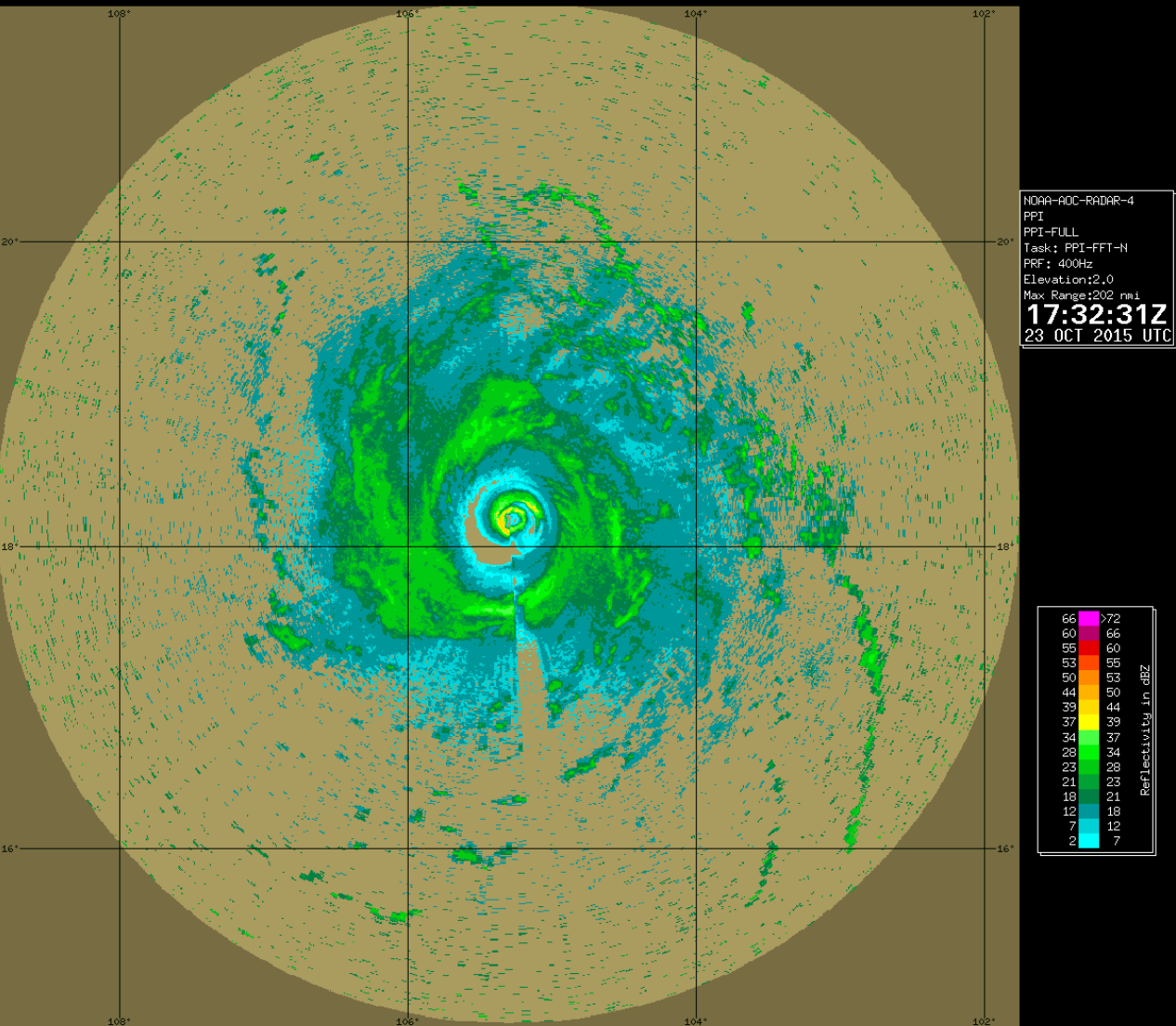
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- WSRA delivered data to NHC; DWL operated w/ limited success
- G-IV flew 3 surveillance missions on Joaquin while P-3 was down
- **Eastern Pacific Hurricane Patricia ops flown from Harlingen, TX in conjunction with NASA B-57 flights.**





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Hurricane

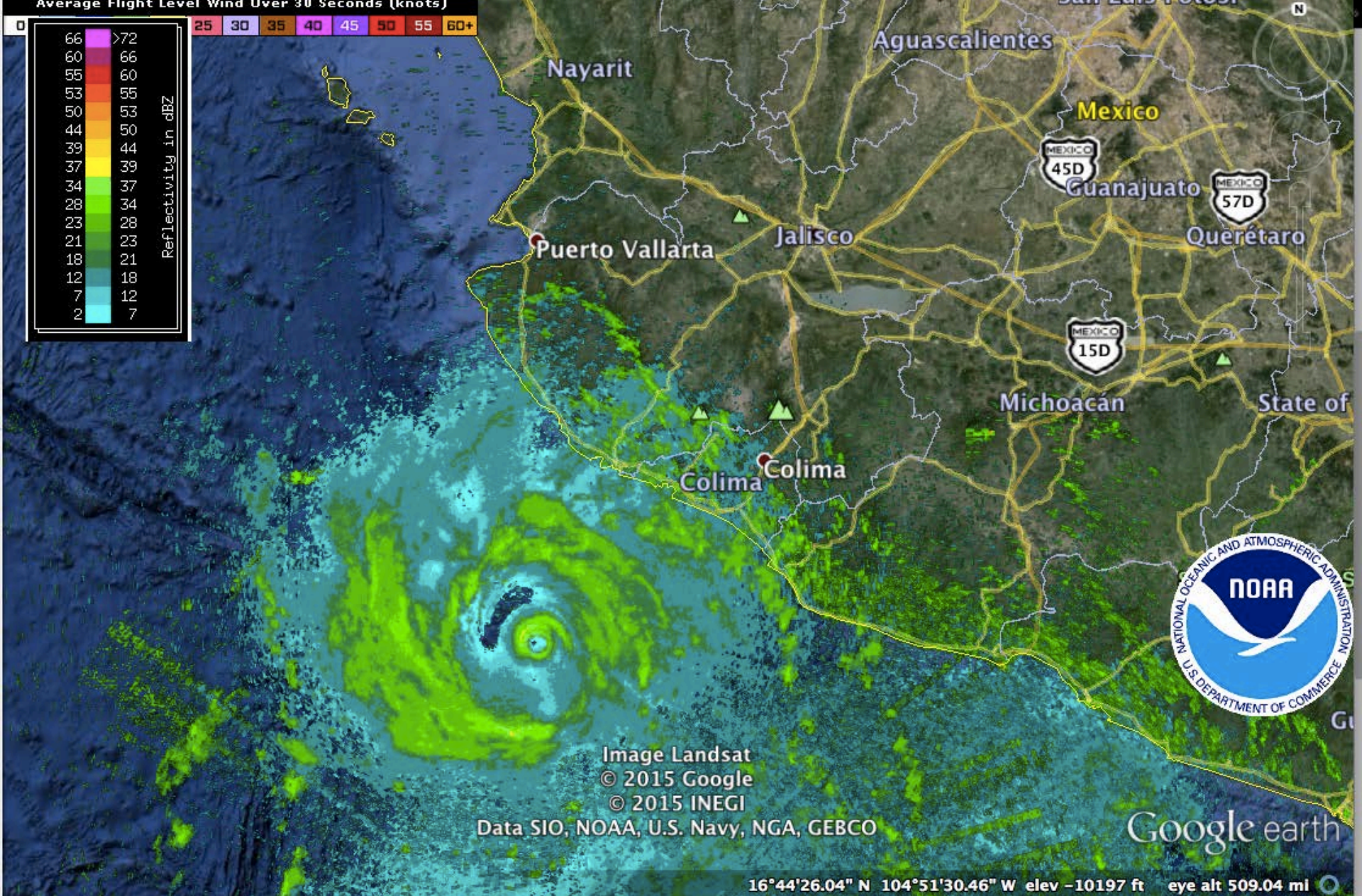
Patricia

2015

**Eastern
Pacific**



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Hurricane Patricia October 23, 2015



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Hurricane Patricia October 23, 2015



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2015 Hurricane Season Highlights (cont.)

- During the 1st penetration of Patricia on the 23rd, the aircraft sustained a +3.5G/-1.5G updraft/downdraft in the southern eyewall.



2015 Hurricane Season Highlights (cont.)

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- **After some discussion a 2nd penetration was made, and this pass showed some weakening of the storm.**



2015 Hurricane Season Highlights (cont.)

- During the 1st penetration of Patricia on the 23rd, the aircraft sustained a +3.5G/-1.5G updraft/downdraft in the southern eyewall.
- After some discussion a 2nd penetration was made, and this pass showed some weakening of the storm.
- **The aircraft returned to its base in Tampa, FL completing an 11+ hour flight.**



2015 Hurricane Season Highlights (cont.)

- During the 1st penetration of Patricia on the 23rd, the aircraft sustained a +3.5G/-1.5G updraft/downdraft in the southern eyewall.
- After some discussion a 2nd penetration was made, and this pass showed some weakening of the storm.
- The aircraft returned to its base in Tampa, FL completing an 11+ hour flight.
- **And finally – there was Hurricane Kate to end the 2015 season. Three back to back TDR missions were flown by the P-3 while Kate was a tropical storm.**



Output As Of 14-Dec-2015

FY 2016 AIRCRAFT ALLOCATION PLAN
FY 2016 Aircraft Allocation Plan - Dec 14, 2015

	BR	DR	SR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP		
AC 675A TURBO COMMANDER - H45RP	934	0	0	SNOW WATER EQUIVALENT AND SOIL MOISTURE SURVEYS 754BH										GRAY-D 180BH	SNOW		
DHC-6 TWIN OTTER - H46RP	740	0	0	SNOW WATER EQUIVALENT AND SOIL MOISTURE SURVEYS 500BH								CORROSION 120BH	ST ANAPPS 120BH	ST ANAPPS 120BH			
DHC-6 TWIN OTTER - H46RP	210	0	0	CORROSION/UPGRADES					COASTAL MAPPING/LID		STOLIDS 100BH	SNOW SURVEY	CORROSION 110BH	SNOW SURVEY			
DHC-6 TWIN OTTER - H50RP	365	464	0	LOGGERHEAD 110BH	3 NEW	SOUTHEAST RIGHT WHALE 110BH 114BH			NEW	FL 140B	FLIR INSTALL		ARCTIC 40BH	STOLDS 40BH	ARCTIC 40BH	HARBOR SEAL PLANE 1 120BH	F
DHC-6 TWIN OTTER - H57RP	748	169	16	COASTAL MAPPING/EMRG. RESP 145BH		NORTHEAST RIGHT WHALE 100BH 94BH		FL COASTAL MAPPING/LID 255BH		NORTHEAST RIGHT WHALE		NEW		NEW	HARBOR SEA 70BH	WEST COAST TORT. 100BH	
GULFSTREAM G-IV-SP - H45RP	419	0	0	HURRICANE FLIGHTS 244BH		ANNUAL MAINT		EL NIÑO RR 175BH		OPS MAINTENANCE		HURRICANE FLIGHTS					
KING AIR 350ER - H66RP	580	0	0	COASTAL MAPPING/EMERGENCY RESPONSE 580BH													
WF-3D ORION - H42RP	222	0	0	REWIING / PM1								CONFIGURATION/INSTRUMENTAT		HUR 142BH/CWS 50BH/COWOTE 30BH 222BH			
WF-3D ORION - H43RP	214	0	200	HURRICANE FLIGHTS 112BH				OCEAN MINDS 90BH	PHASE MAINT		ICE BRIDGE 2-90BH		HAT 12B	HURRICANE FLIGHTS			
Fleet Totals	4432	633	216														

FY2016 Flight Schedule



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WP-3D Service Life Extension – Executive Summary

- \$326M to NOAA to Address Sandy Mitigation Efforts (\$42.3M to OMAO after sequestration to be used in three (3) project areas).
- Project Areas:
 - **T56-A-14 Engine Refresh**
 - Overhaul to Zero Time
 - Series III Reliability Enhancements
 - Series 3.5 Engine Enhancement Package
 - **WP-3D Re-Winging**
 - Outer Wing
 - Horizontal Stabilizer
 - **Avionics Upgrades**



WP-3D Service Life Extension – Engine Upgrade

Scope

- Completely overhauled “zero time” engines
- Series III Reliability Enhancements
- Series 3.5 Enhancement Package



Timeline

- Overhauled and Upgraded Test Engine – February 2014
- Test Program Instrumentation – March 2014
- Ground Testing – April 2014
- Flight Testing – April/May 2014
- Airworthiness Determination – November 2014
- Overhaul, upgrade and install on N43RF complete – March 2015
- Overhaul, upgrade and install on N42RF complete – October 2015

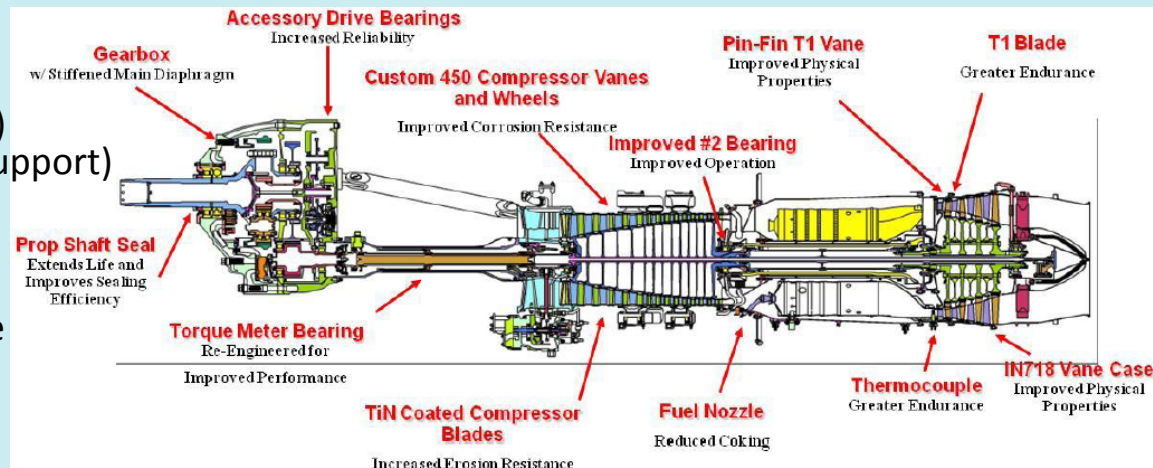


Partners

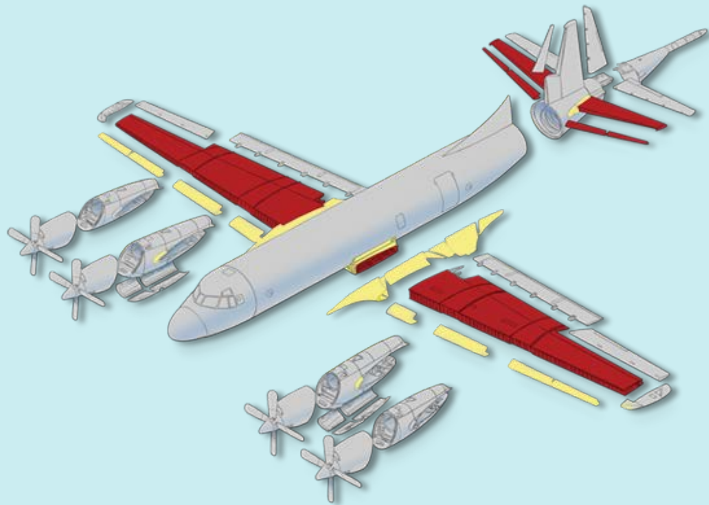
- Rolls-Royce (Engine OEM)
- Lockheed Martin (Aircraft OEM)
- Segers Aero (Engine Overhauls)
- USAF Test Squadron (Technical Support)
- NAVAIR (Technical Support and Flight Support)

Benefits

- 10% Increase in Fuel Efficiency
- 10% Increase in Operational Flight Time
- 20% Reduction in Maintenance Costs
- NOAA leading the P-3 community



Re-wing Kit Installation



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Current progress with
re-winging of N42RF



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WP-3D Avionics Upgrades

- Communications**
- Infrastructure**
- Flight Instruments**
- Scientific Radar**



WP-3D Avionics Upgrades - Communications

Digital HF and Vertical Stab. Antenna
- Maintainability, no more 'long wire' antennas



2nd High Speed Inmarsat System
- Redundancy, extra bandwidth

Replace AIC-22 ICS System
- Zonal communications, cockpit hot mic



WP-3D Avionics Upgrades - Infrastructure

Power and Signal Wiring Renewal

- Replacement Wing and Tail Harnesses (Ship's & science)
- New 60 Hz freq. converters



Cloud Physics Pylons

- Production version of prototype



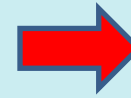
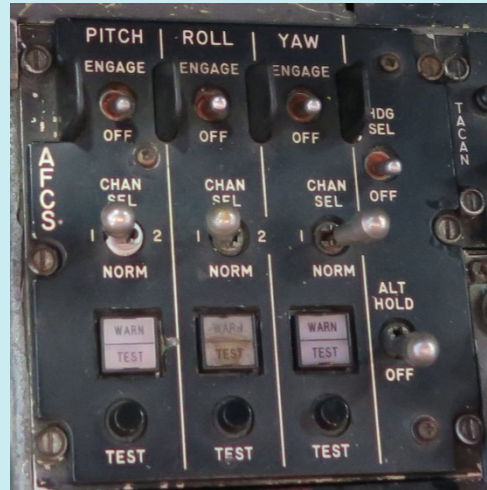
Design new racks and floor load enhancements

- Existing racks are from 1975, built by U.S. NBS
- Selective floor reinforcement, similar to TAP-3



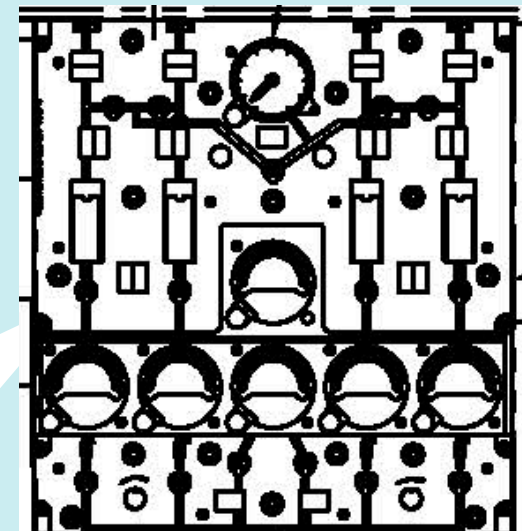
WP-3D Avionics Upgrades – Flight Instruments

Replace ASW-31 with ASW-60 Autopilot



Add Cockpit Voice Recorder,
Flight Data Recorder and
Wing Life Monitoring System

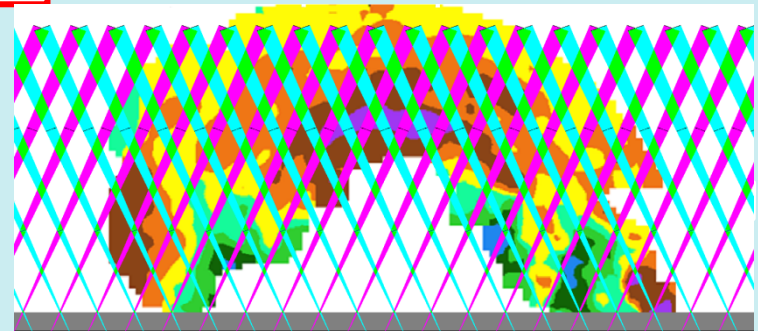
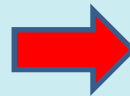
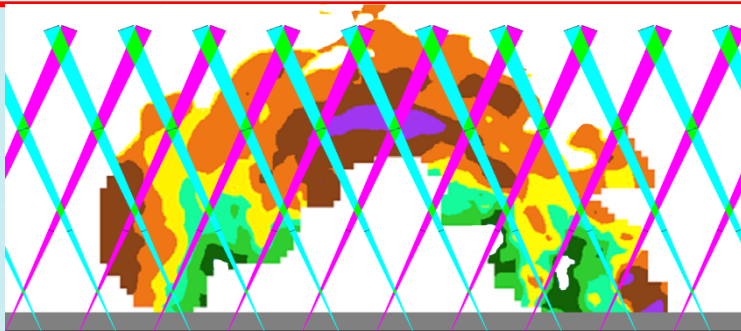
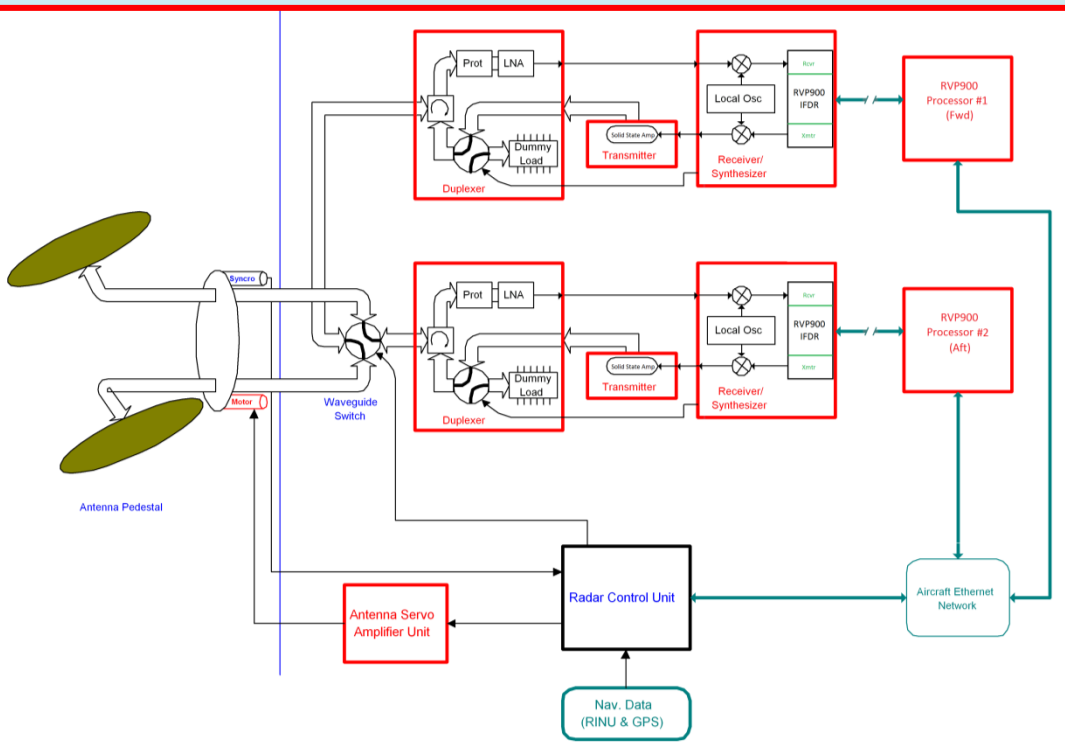
Install Digital Fuel
Quantity System



WP-3D Avionics Upgrades – Scientific Radar

Upgrade Tail Doppler Radar

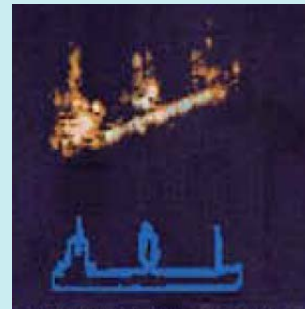
- Completely dual system (Xmtrs, Rcvrs, Processors) for higher along-track resolution and redundancy
- 8 KW Solid State Power Amplifiers for improved sensitivity (5 dBZ -> -9 dBZ)
- Upgraded processors are the same as used in NOAA's NEXRAD WSR-88D ground radar
- Replacement antenna motors to double rotation speed and along-track resolution



WP-3D Avionics Upgrades – Scientific Radar

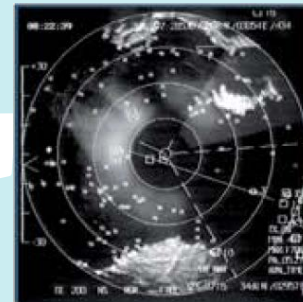


Replace Lower Fuselage
Weather Radar with
AN/APY-11 Multimode
Radar System



Inverse Synthetic
Aperture (ISAR)

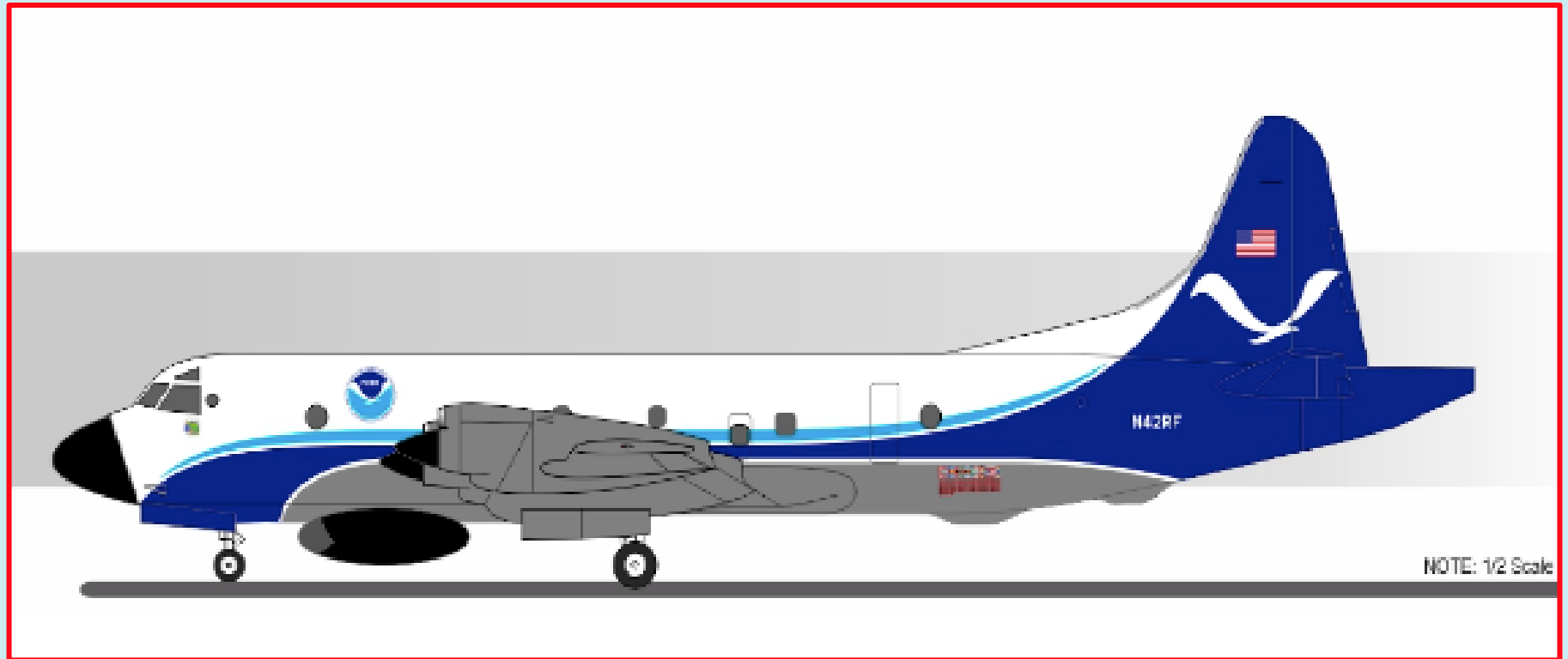
Weather, AIS,
Air-to-Air



Synthetic
Aperture (SAR)



The New Look



NOTE: 1/2 Scale



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FY17 AOC Challenges

- MacDill AFB Runway Closure – October 20 to December 20 2016.
- N43RF Scheduled Induction Date for Re-winging is February 2017.
- AOC must vacate Hangar 5 at MacDill NLT 1 July 2017.

