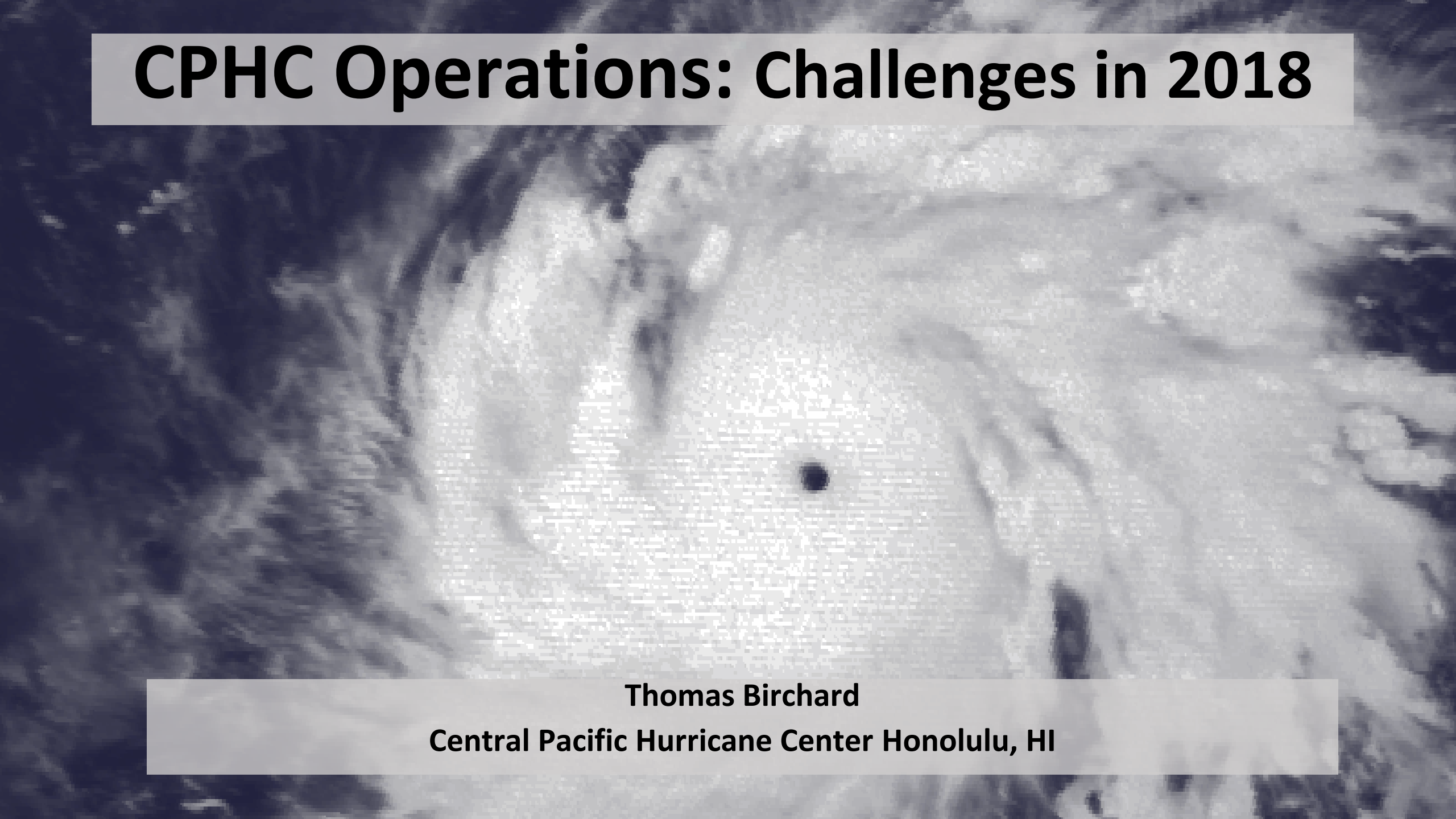
CPHC Operations: Challenges in 2018



Thomas Birchard

Central Pacific Hurricane Center Honolulu, HI

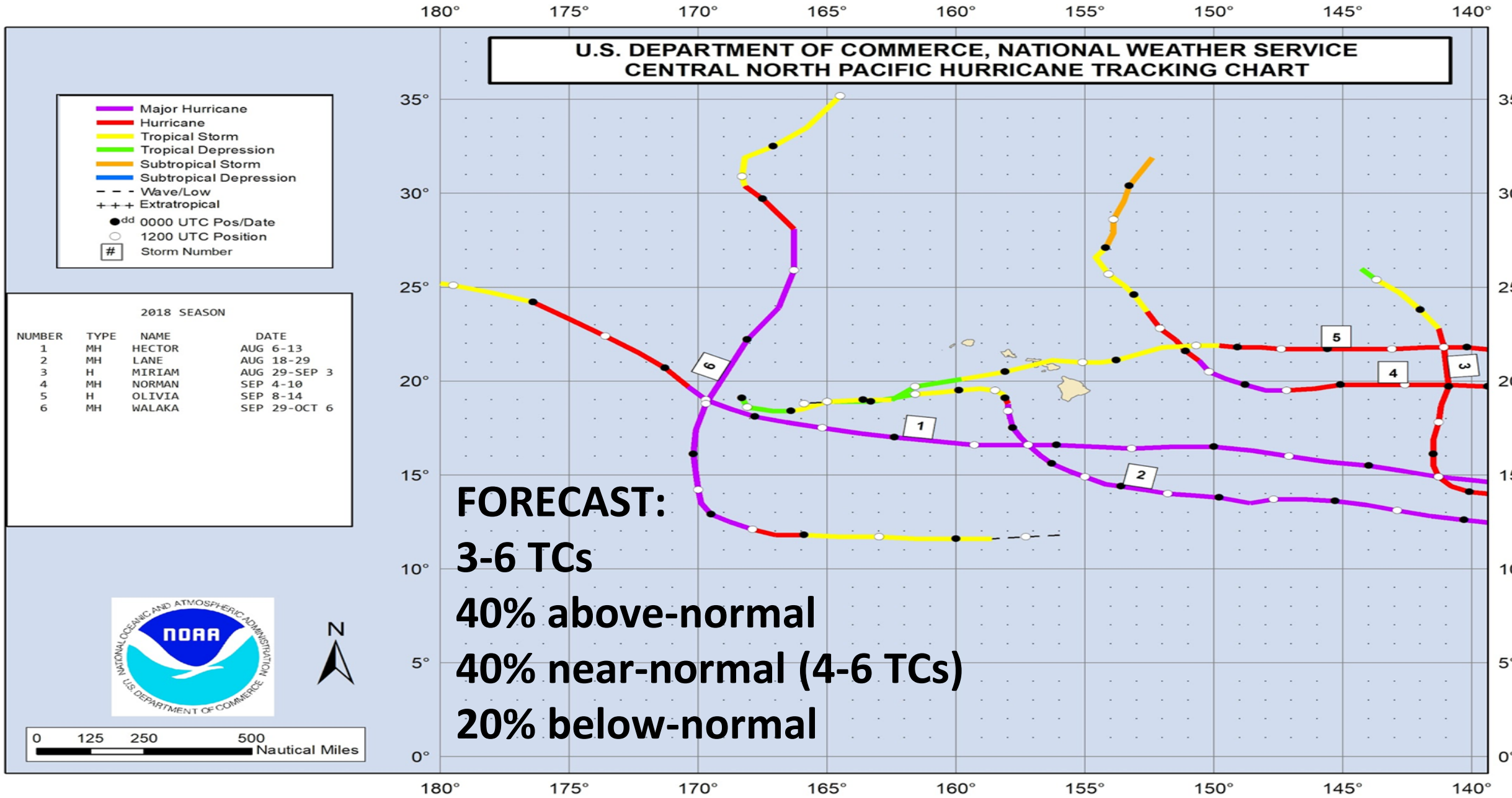
GOALS

- **Summarize 2018 central Pacific TC season**

…to contextualize…

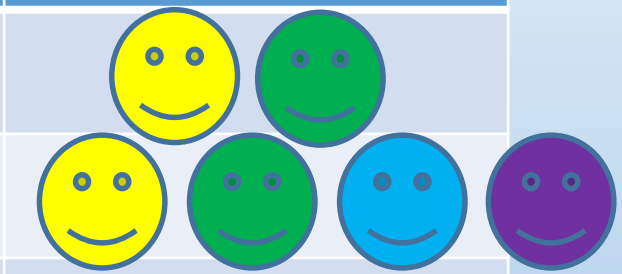
- **CPHC operational challenges**

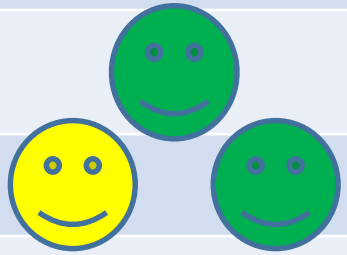
…to potentially fuel future research…


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
CENTRAL NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Subtropical Storm
Subtropical Depression
Wave/Low
Extratropical
ddd 0000 UTC Pos/Date
1200 UTC Position
Storm Number
2018 SEASON
NUMBER TYPE NAME DATE
1 MH HECTOR AUG 6-13
2 MH LANE AUG 18-29
3 H MIRIAM AUG 29-SEP 3
4 MH NORMAN SEP 4-10
5 H OLIVIA SEP 8-14
6 MH WALAKA SEP 29-OCT 6
FORECAST:
3-6 TCs
40% above-normal
40% near-normal (4-6 TCs)
20% below-normal
N
0 125 250 500 Nautical Miles
180° 175° 170° 165° 160° 155° 150° 145° 140°
35° 30° 25° 20° 15° 10° 5° 0°

2018 CPHC summary

NAME	DATE	MAX WIND (mph)	RECON?
HECTOR	6-13 AUG	155	
LANE	18-29 AUG	160	
MIRIAM	29 AUG – 3 SEP	100	
NORMAN	4-10 SEP	120	
OLIVIA	6-14 SEP	85	
WALAKA	29 SEP – 6 OCT	160	





 = WC-130  = G-IV  = HRD P-3  = NASA DC-8

2018 CPHC summary

- Hector brought damaging surf to S shores
- Lane brought record rainfall, but associated surf was not as large as expected
- Olivia made 2 landfalls in Maui county as weak TS
- Well-anticipated formation of Walaka followed by rapid intensification to MH. Wiped out an island in the Papahanaumokuakea Marine National Monument

Anticipating Intensity Change

- Hector and Lane were especially intense – led to unique forecast challenges w/ multiple ERCs
- Olivia's interaction with mid- and upper-level flow varied as associated thunderstorms developed and dissipated – led to dramatic changes in forward speed and motion near Big Island and Maui
- Walaka rapid intensification

Communicating forecast uncertainty

- “Controlling” messaging during TC operations in social media era
- Key messages utilized in TCD during Lane and Olivia
- Communicating flooding risks – “how much rain will we get?” Significant difference between 6”/2 hours and 6”/12 hours. *Time of concentration* in Hawaii (time for a rain drop to reach the sea) is short

Anticipating Coastal Impacts

- Increasingly important part of TC forecast process due to coastal erosion and sea-level rise

- Captured fetches lead to increased forecast uncertainty/errors

Storm Surge Forecasting

- Utilize “canned” SLOSH MEOW/MoM data internally in 2019 to inform storm surge forecast values, but no Storm Surge Watch/Warnings for Hawaii in 2019.

- Begin experimental issuance of Storm surge Watch/Warnings for Hawaii in 2020.

- P-Surge could further improve operational guidance given most impacts are from distant TCs

Anticipating TC genesis

- TC Walaka – September/October 2018
- Well anticipated by forecast models and TWO
- Walaka marked the completion of the list of 48 Hawaiian names

List 1	List 2	List 3	List 4
Akoni	Aka	Alika	Ana
Ema	Ekeka	Ele	Ela
Hone	Hene	Huko	Halola
Iona	Iolana	Iopa	Iune
Keli	Keoni	Kika	Kilo
Lala	Lino	Lana	Loke
Moke	Mele	Maka	Malia
Nolo	Nona	Neki	Niala
Olana	Oliwa	Omeka	Oho
Pena	Pama	Pewa	Pali
Ulana	Upana	Unala	Ulika
Wale	Wene	Wali	Walaka

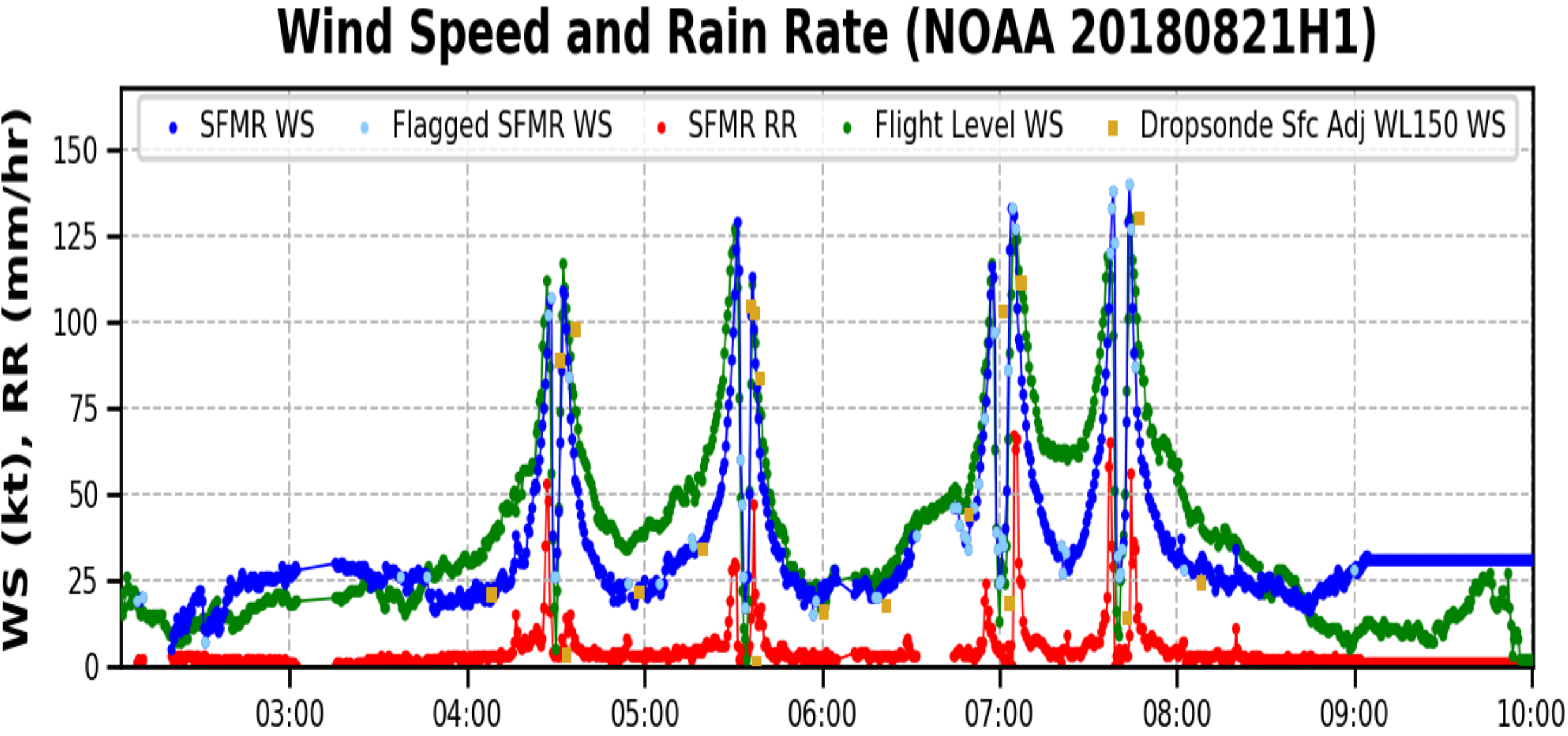
Reconnaisance

- Optimizing sometimes contradictory data and managing data flow
- Balancing crew and aircraft safety with operational requirements
- Anticipating initial need for reconnaissance and CARCAH's operational needs
- G-IV Flight planning – typically done by Chris Landsea for CPHC requirements

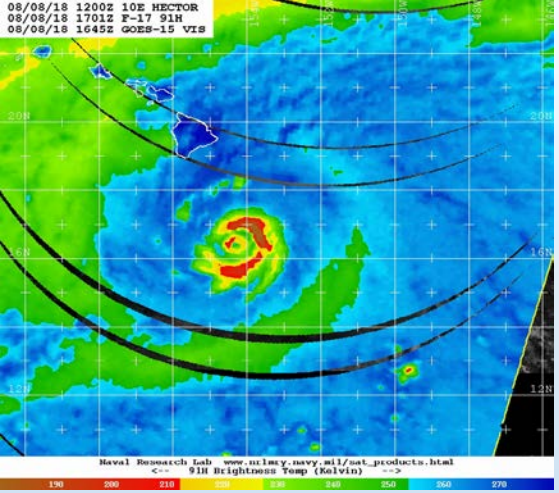
SFMR at very high wind speeds (slide content stolen from Mike Brennan)

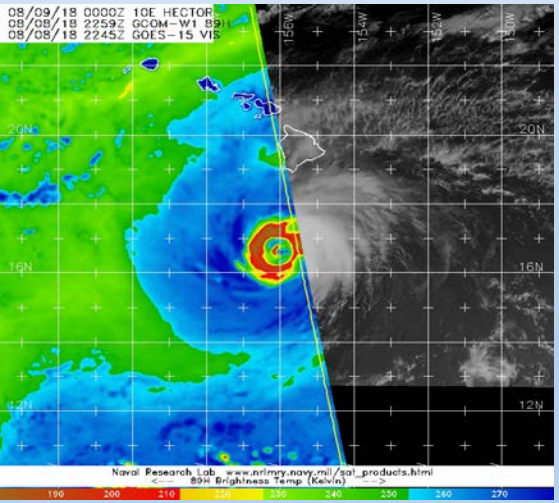
- CPHC's experiences with Lane similar to NHC's 2017 experiences with Irma and Maria (SFMR > FL winds)
- Calibration of SFMR at very high wind speeds (125+ kt)
- Inconsistencies between instruments, retrievals, data processing and HDOB formulation between NOAA and AF aircraft
- What do the data quality flags really mean? Can they be made more useful to forecasters?
- How should SFMR winds that exceed flight-level winds be handled?

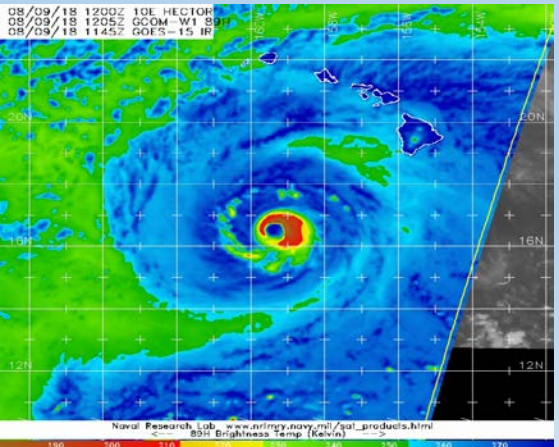
LANE

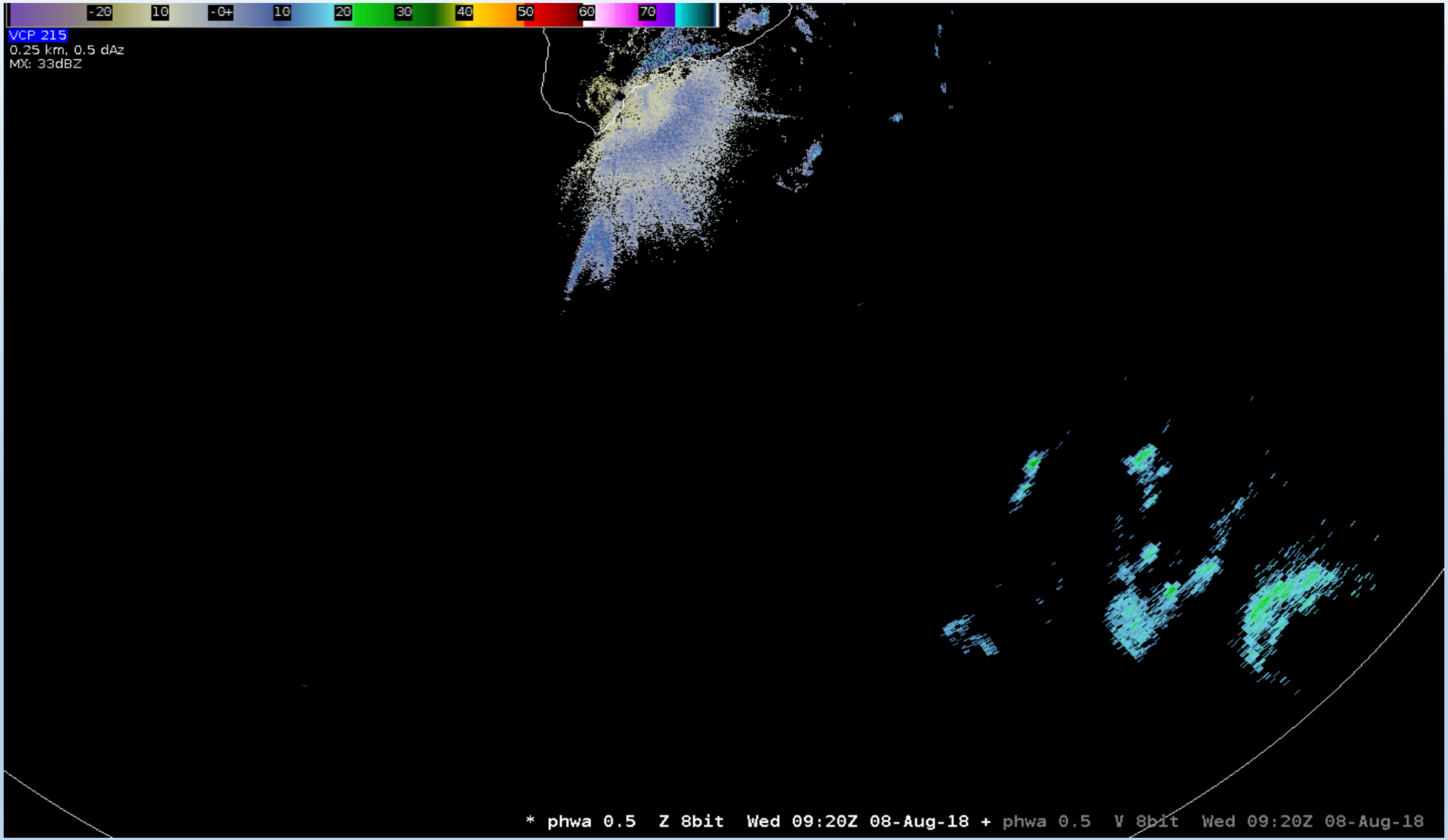

Wind Speed and Rain Rate (NOAA 20180821H1)
SFMR WS
Flagged SFMR WS
SFMR RR
Flight Level WS
Dropsonde Sfc Adj WL150 WS
WS (kt), RR (mm/hr)
150
125
100
75
50
25
0
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00

HECTOR





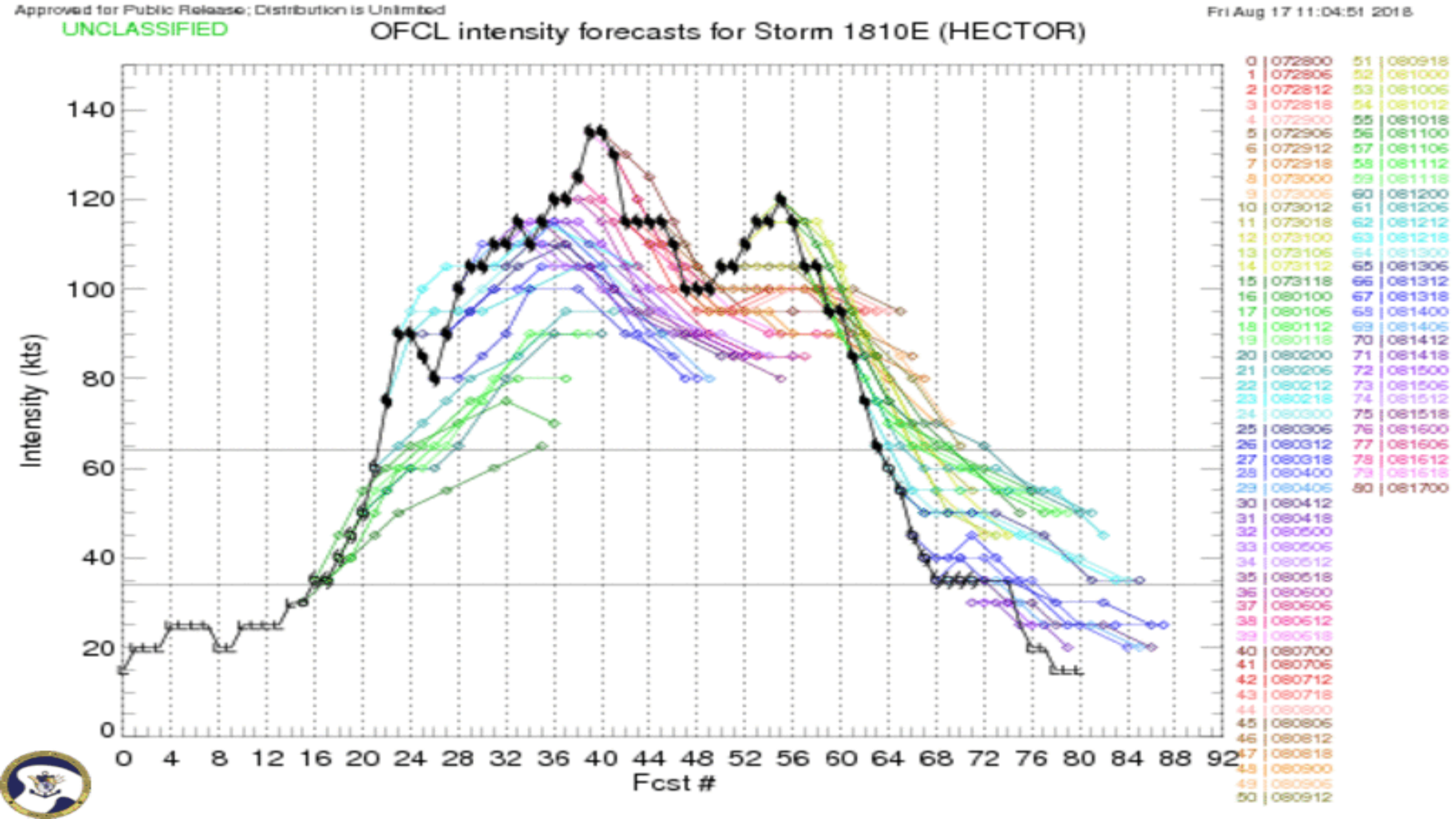




"Rather unusual to witness concentric eyewalls from a land-based Hawaii radar, as has occurred with Hector today."

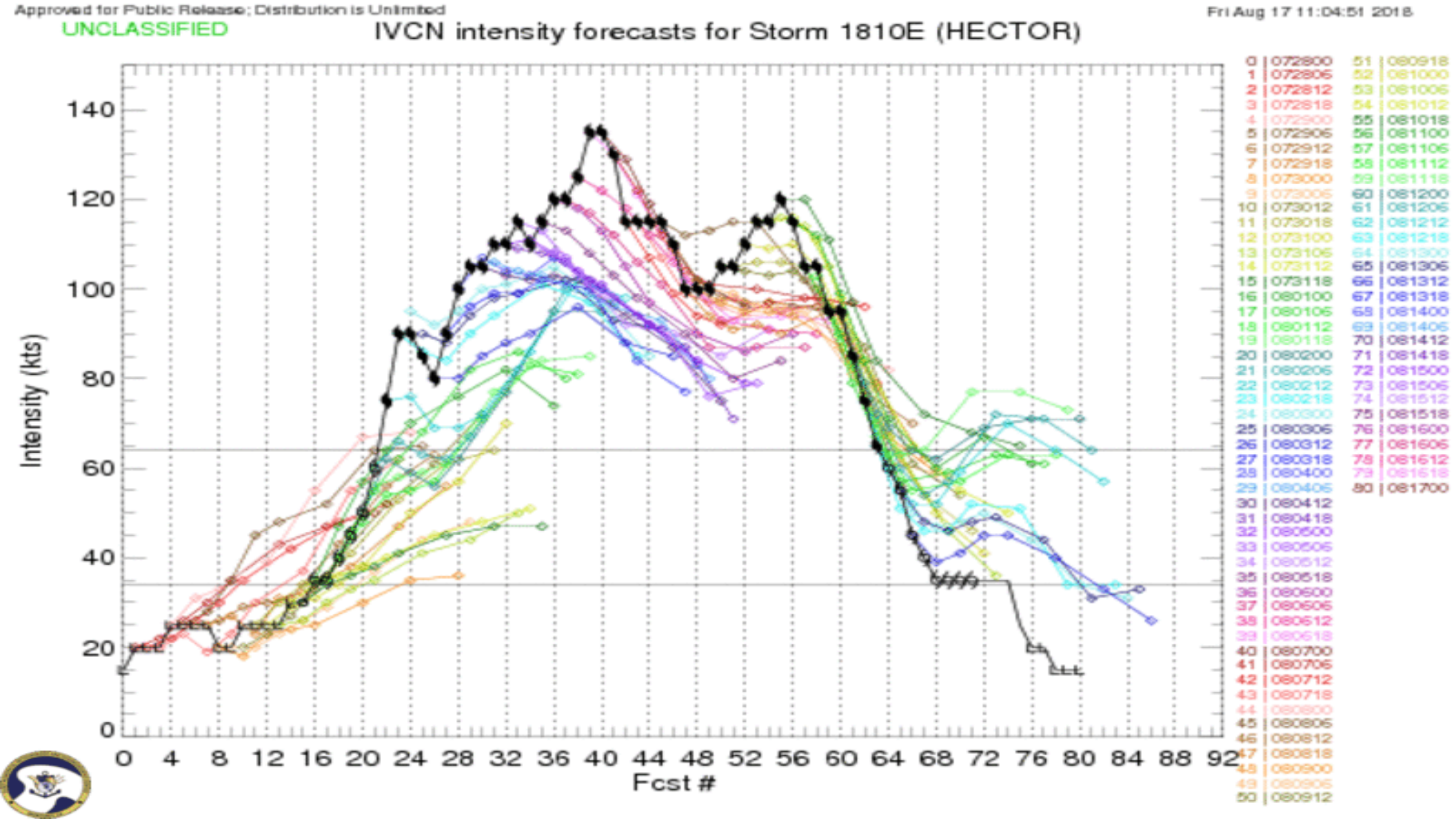
Fri Aug 17 11:04:51 2018

OFCL intensity forecasts for Storm 1810E (HECTOR)

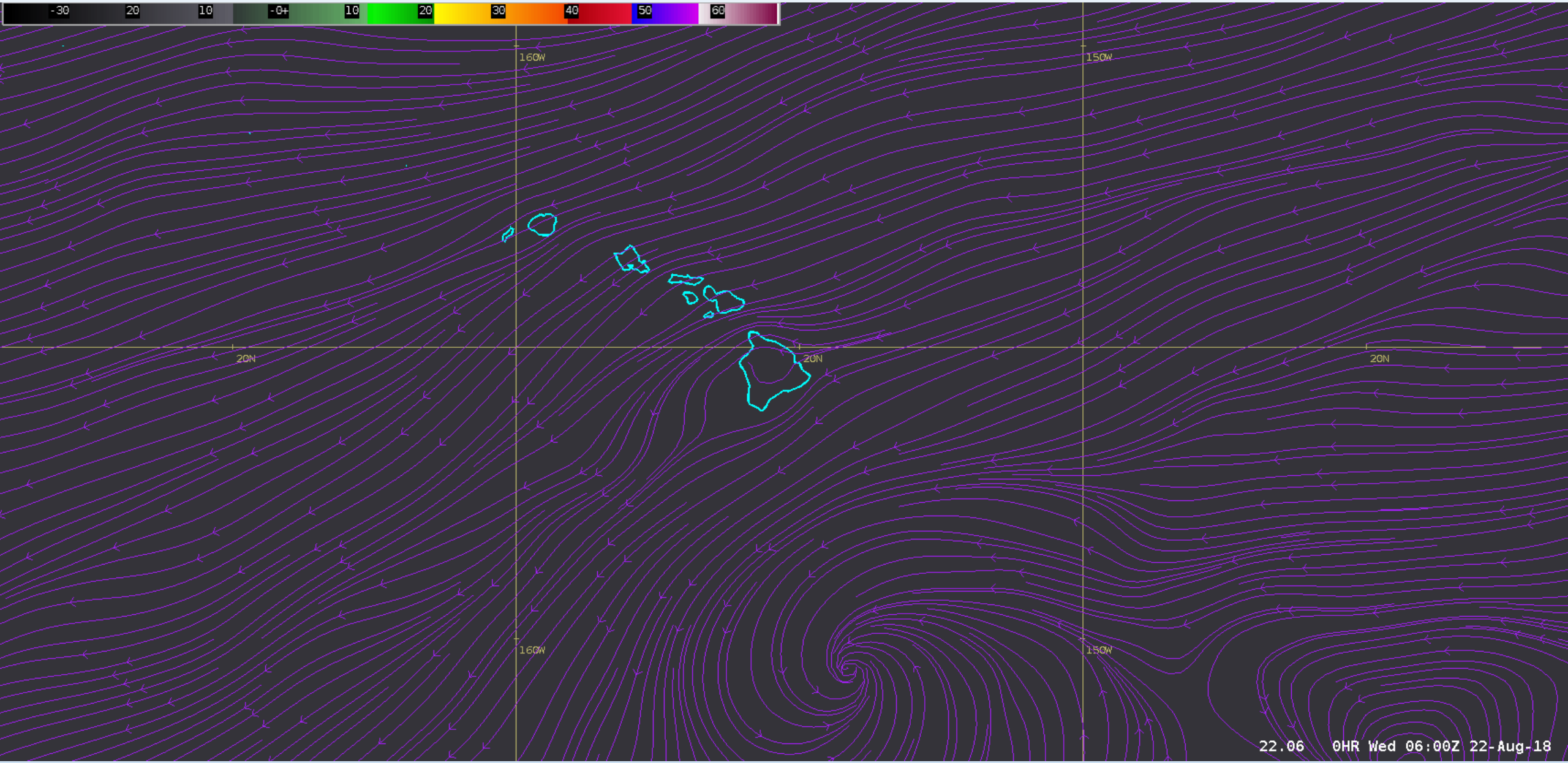


Fri Aug 17 11:04:51 2018

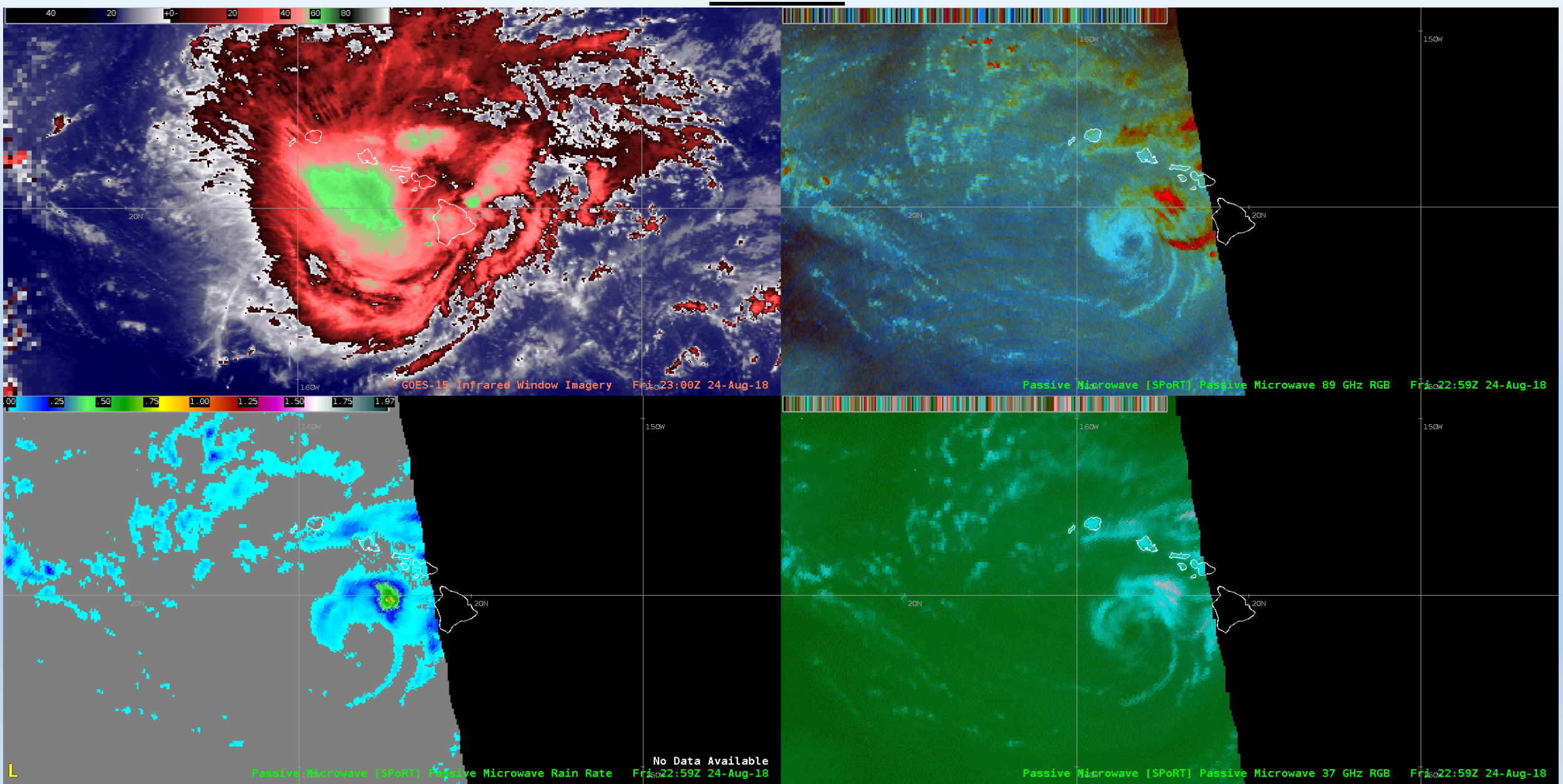
IVCN intensity forecasts for Storm 1810E (HECTOR)



LANE

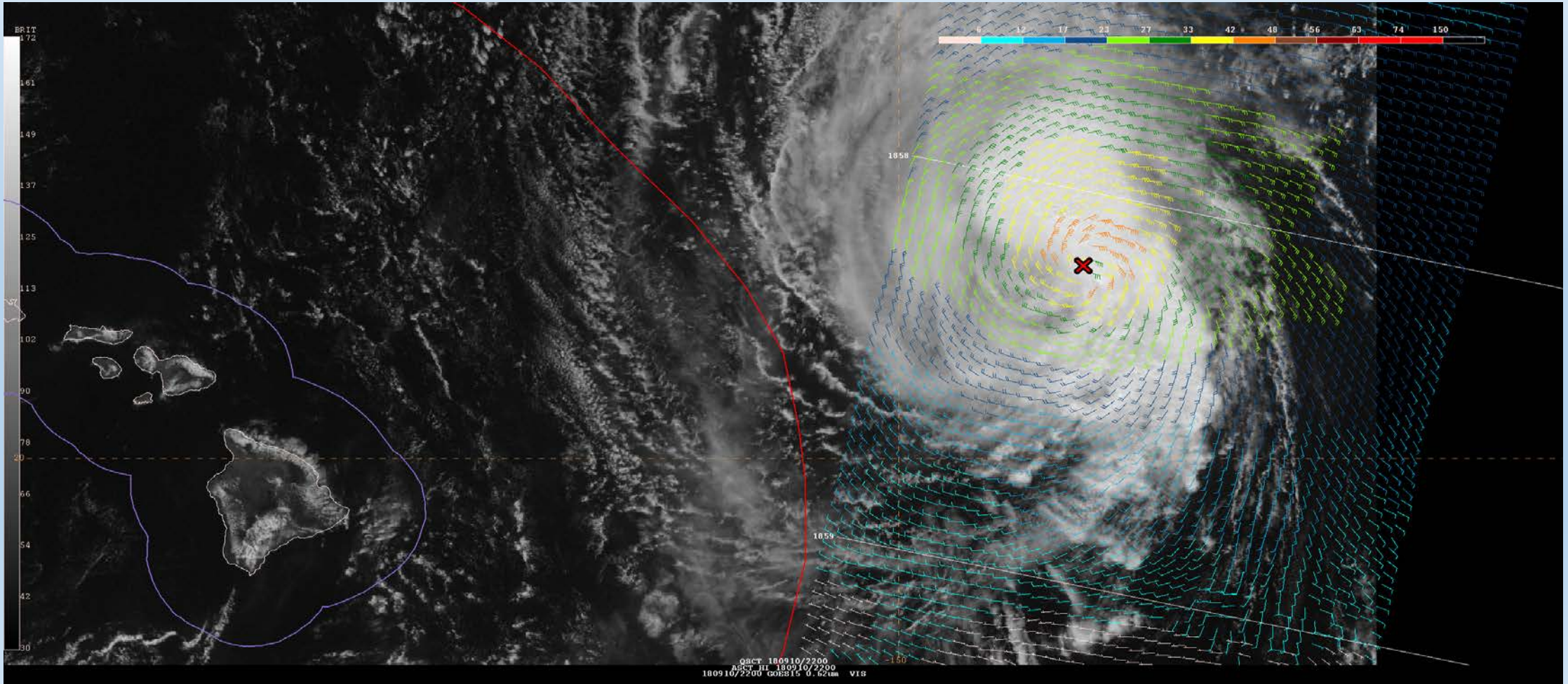

-30
20
10
-0+
10
20
30
40
50
60
160W
150W
20N
20N
20N
160W
150W
22.06 0HR Wed 06:00Z 22-Aug-18

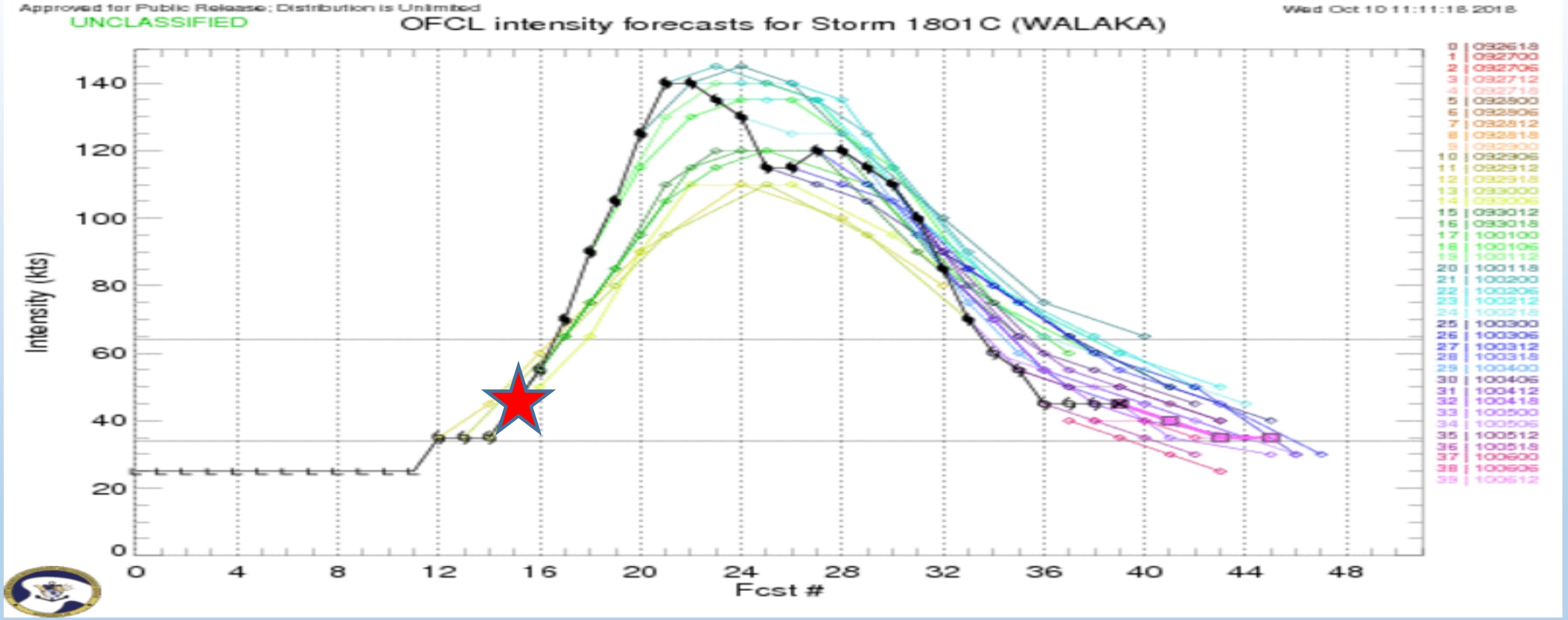
LANE


GOES-15 Infrared Window Imagery Fri 23:00Z 24-Aug-18
Passive Microwave [SPoRT] Passive Microwave 89 GHz RGB Fri 22:59Z 24-Aug-18
Passive Microwave [SPoRT] Passive Microwave Rain Rate Fri 22:59Z 24-Aug-18
No Data Available
Passive Microwave [SPoRT] Passive Microwave 37 GHz RGB Fri 22:59Z 24-Aug-18

OLIVIA

Double landfall in Maui county after herky-jerky motion just E of Maui and the Big Island





SHIPS Prob RI for 20kt/ 12hr RI threshold= 40% is 6.6 times climatological mean (6.1%)
SHIPS Prob RI for 25kt/ 24hr RI threshold= 93% is 7.1 times climatological mean (12.5%)
SHIPS Prob RI for 30kt/ 24hr RI threshold= 90% is 11.2 times climatological mean (8.4%)
SHIPS Prob RI for 35kt/ 24hr RI threshold= 75% is 12.5 times climatological mean (6.0%)
SHIPS Prob RI for 40kt/ 24hr RI threshold= 70% is 17.5 times climatological mean (4.0%)
SHIPS Prob RI for 45kt/ 36hr RI threshold= 85% is 13.1 times climatological mean (6.5%)
SHIPS Prob RI for 55kt/ 48hr RI threshold= 96% is 16.3 times climatological mean (5.9%)
SHIPS Prob RI for 65kt/ 72hr RI threshold= 60% is 12.5 times climatological mean (4.8%)

COOP: Backup of HFO during Lane & Olivia

- 9 operational AWIPS workstations at HFO/CPHC
- To free up workstations, backup of Aviation and "Center" Marine desks was supplied by AWC, WFO Monterey and TAFB during Lane (Aviation desk during Olivia)
- Holistic NWS-wide approach to backup - i.e., Boise MIC→WFO Monterey

Miscellaneous

- Network vulnerabilities at NHC in June & July increased chances of short-fuse backup requirements

- Compostion of Intermediate Advisories remains more challenging than it should be → ATCF software limitations

Miscellaneous

- BBC reporter James Cook (!!!) hit by tree during live radio report about Hurricane Lane in Hawaii

CPHC updates

- All TC best tracks have been completed through 2017 season
- Changes to URLs – **www.prh.noaa.gov** decommissioned May 11 2019. CPHC to move to **hurricanes.gov**

SUMMARY

- **CPHC 2018 operational challenges included;**

1) ***Anticipating intensity changes and subsequent impacts on track forecast***

2) ***Anticipating coastal impacts due to surf/surge/tide***

3) ***Communicating forecast uncertainty***

4) ***SFMR in areas of extreme winds***


Thank You
Questions & Comments