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# TROPICS Data Products Update

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# Nominal TROPICS Data Maturity Matrix

Data Products	Level	TROPICS-01	TROPICS-03	TROPICS-05	TROPICS-06	TROPICS-07
Antenna Temperature	L1a	Provisional-2 V1.0 (Aug. 2021 to Dec. 2023)	Validated-1 V1.0	Provisional V0.2	Validated-1 V1.0	Provisional V0.2 (15-Jun to 31-Jul)
Brightness Temperature	L1b					
Unified Resolution	L2a					
MIRS Atmos. Vert. Temp. & Moisture Prof.	L2b	Provisional-2 V1.0	Validated V1.0	Beta*	Validated V1.0	Beta*
Instant. Surf. Rain Rate	L2b	Provisional-2 V1.0	Validated V1.0	Provisional V0.2	Validated V1.0	Provisional V0.2
TCIE TC Intensity (MSLP & MSWS)	L2b	Validated-1	Validated-1	Validated-1	Validated-1	Validated-1

Science team (not delivered or evaluating)
  Being integrated at DPC
  Preparing for GES DISC
  DAAC public release

\* Waiting for NN AVP approach due to residual demixing or calibration issues



# TROPICS Radiance Data Products

Data Products	Level	Availability at DAAC	Notes
Antenna Temperature	L1a	Yes	-
Brightness Temperature	L1b	Yes	Includes antenna sidelobe correction
Adjusted Brightness Temperature	L1c	New	1) Interpolates scan pattern to a regularized pattern 2) Includes limb-adjustments (Mitch Goldberg)
Unified Brightness Temperature	L2a	Yes	Blurs finer resolution G-band channels to larger resolution F-band channels (for temperature profiles) using Backus-Gilbert technique

netCDF format



# TROPICS L2b Geophysical Data Products

Data Products	Availability at DAAC	Algorithm Heritage	Developer
Atmos. Vert. Temp. & Moisture Prof.	Yes	NOAA/NESDIS/STAR Microwave Integrated Retrieval System (MIRS)	Greenwald/Bennartz
Atmos. Vert. Temp. & Moisture Prof.	New	Neural Network from NASA Aqua: AIRS/AMSU	Pieper/Milstein/Blackwell
Precipitation Ice Water Path	New	K-d tree using GPM-DPR-GMI	Chen/Bennartz
Instant. Surf. Rain Rate	Yes	Precipitation Retrieval and Profiling Scheme (PRPS)	Matsui/Kidd
TC Intensity (MSLP & MSWS)	In progress	Tropical Cyclone Intensity Estimate algorithm (TCIE)	Herndon/Velden
TC Intensity (MSLP & MSWS)	In progress	Hurricane Intensity and Structure Algorithm (HISA)	Chirokova/DeMaria
TC Intensity (MSLP & MSWS)	New	DeepMicroIRNet (D-MINT-183)	Griffin/Herndon/Velden

Minimum Sea Level Pressure (MSLP) and Maximum Sustained Winds Speed (MSWS)



# Nominal New TROPICS Data Maturity Matrix

Data Products	Level	TROPICS-01	TROPICS-03	TROPICS-05	TROPICS-06	TROPICS-07
Antenna & Brightness Temperature (For Reference)	L1a & L1b	Provisional-2 V1.0 (Aug. 2021 to Dec. 2023)	Validated-1 V1.0	Provisional V0.2	Validated-1 V1.0	Provisional V0.2 (15-Jun to 31-Jul)
Limb-adjusted Brightness Temp.	L1c	Provisional-2 V1.0	Validated-1 V1.0	Provisional V0.2	Validated-1 V1.0	Provisional V0.2
NN Atmos. Vert. Temp. & Moisture Profile *	L2b	Provisional-2 V1.0	Validated-1 V1.0	Provisional V0.2	Validated-1 V1.0	Provisional V0.2
D-MINT-183 TC Intensity (MSLP & MSWS) *	L2b	Provisional-2 V1.0	Validated V1.0	Provisional V0.2	Validated V1.0	Provisional V0.2
HISA TC Intensity (MSLP & MSWS)	L2b	Validated-1	Validated-1	Validated-1	Validated-1	Validated-1

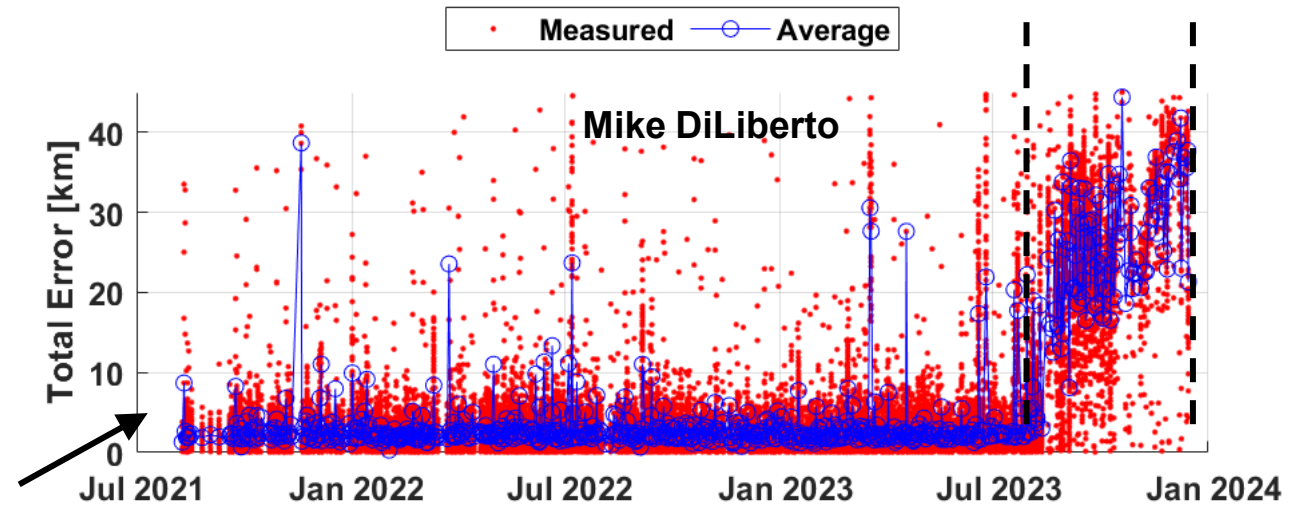
 Science team (not delivered or evaluating)
  Being integrated at DPC
  Preparing for GES DISC
  DAAC public release



# GPS Issues

- All of TROPICS GPS receivers stopped working. See timeline in table below.
- Mitigating GPS loss with an orbital propagator with frequent ephemeris and timing updated from ground contacts (same mitigation when Pathfinder lost GPS last year)
- See residual Pathfinder geolocation error after GPS loss in graph below (expect the same for all CubeSats)
- TROPICS team is investigating a couple of options to improve geolocation (one might improve historical record)

CubeSat	Beginning of GPS Issues	Notes
TROPICS-01	2-Aug-2023	Mission ended on 17-Dec-2023
TROPICS-03	26-Sep-2024	
TROPICS-05	12-Oct-2024	
TROPICS-06	20-Aug-2024	On 24-Feb-2024, T-06 had geolocation degradation due to loss of timing signal.

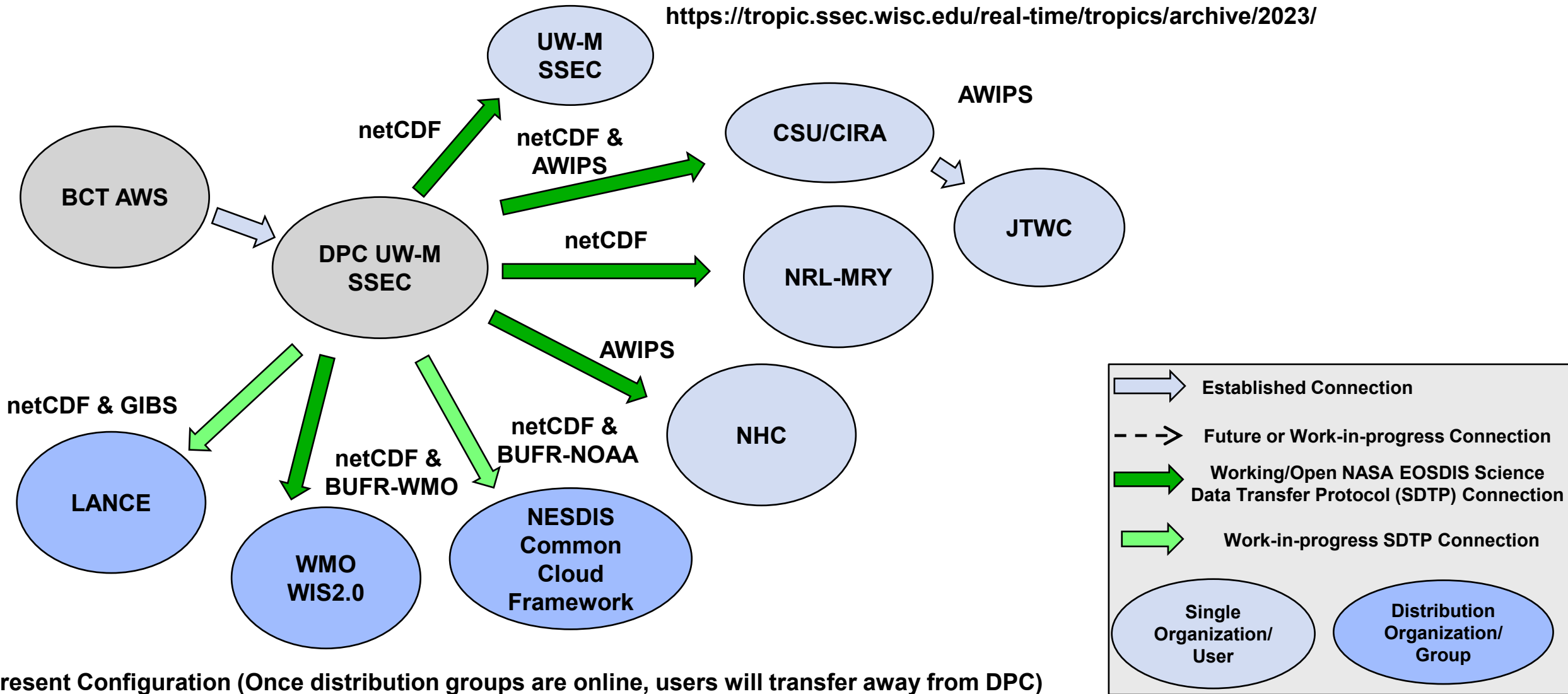


Pathfinder Geolocation Accuracy from Coastline Inflection point Method (CIM)



# TROPICS NRT Organization Flowchart

<https://tropic.ssec.wisc.edu/real-time/tropics/archive/2023/>



Present Configuration (Once distribution groups are online, users will transfer away from DPC)

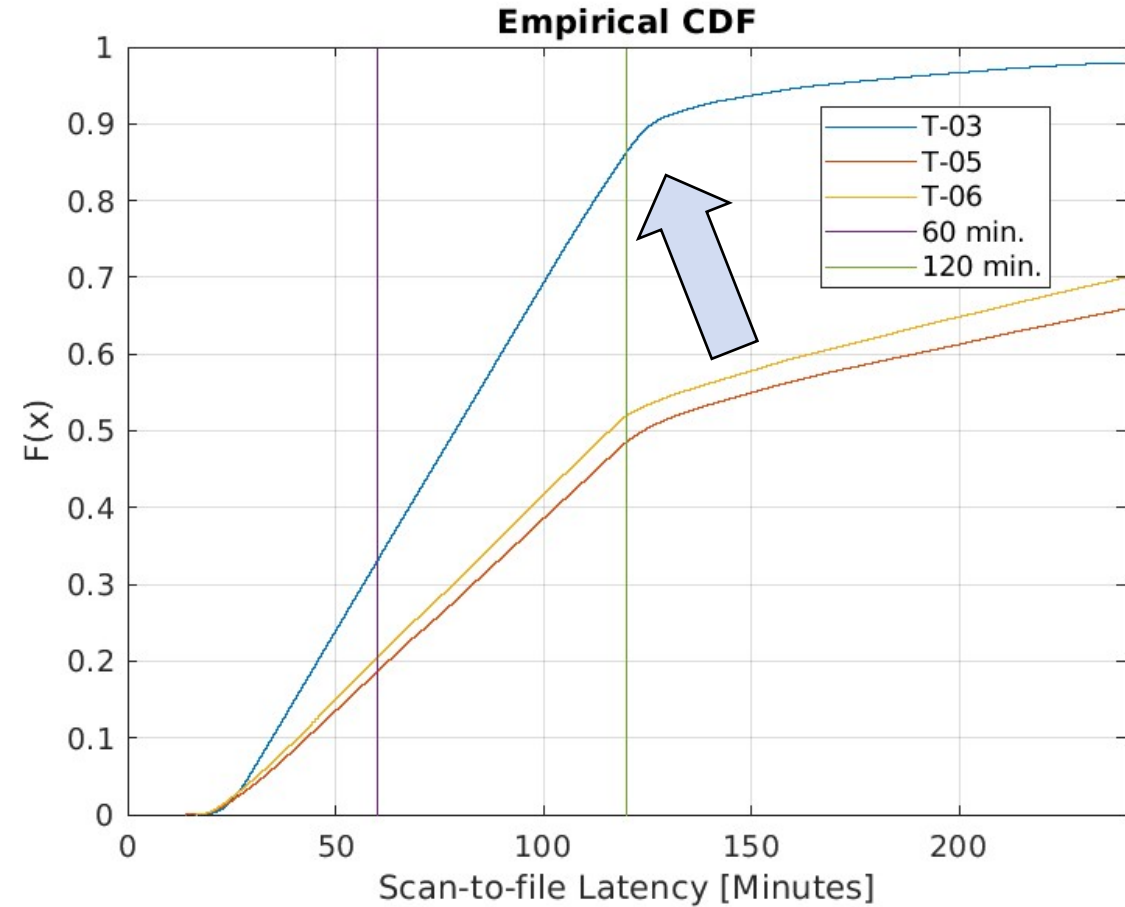


# NRT Latency Update

Measurement/Observation (scan) to data product file ready at DPC

All three active CubeSats now use the Dubai ground station (see start dates below), so T-05 & T-06 should have latency curves like T-03 now.

TROPICS-03: 11-July-2024  
TROPICS-06: 14-Oct-2024  
TROPICS-05: 16-Oct-2024



5-Aug-2024 to 22-Aug-2024





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# Backup



# Nominal TROPICS Data Maturity Matrix (Last Quarterly in Aug. 2024)

Data Products	Level	TROPICS-01	TROPICS-03	TROPICS-05	TROPICS-06	TROPICS-07	
Antenna Temperature	L1a	Provisional-2 V1.0 (Aug. 2021 to Dec. 2023)	Provisional V0.2	Validated-1 V1.0	Provisional V0.2	Validated-1 V1.0	Provisional V0.2 (15-Jun to 31-Jul)
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Unified Resolution	L2a						
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TCIE TC Intensity (MSLP & MSWS)	L2b	Provisional	Provisional	Provisional	Provisional	Provisional	



Update being developed



Being integrated at DPC



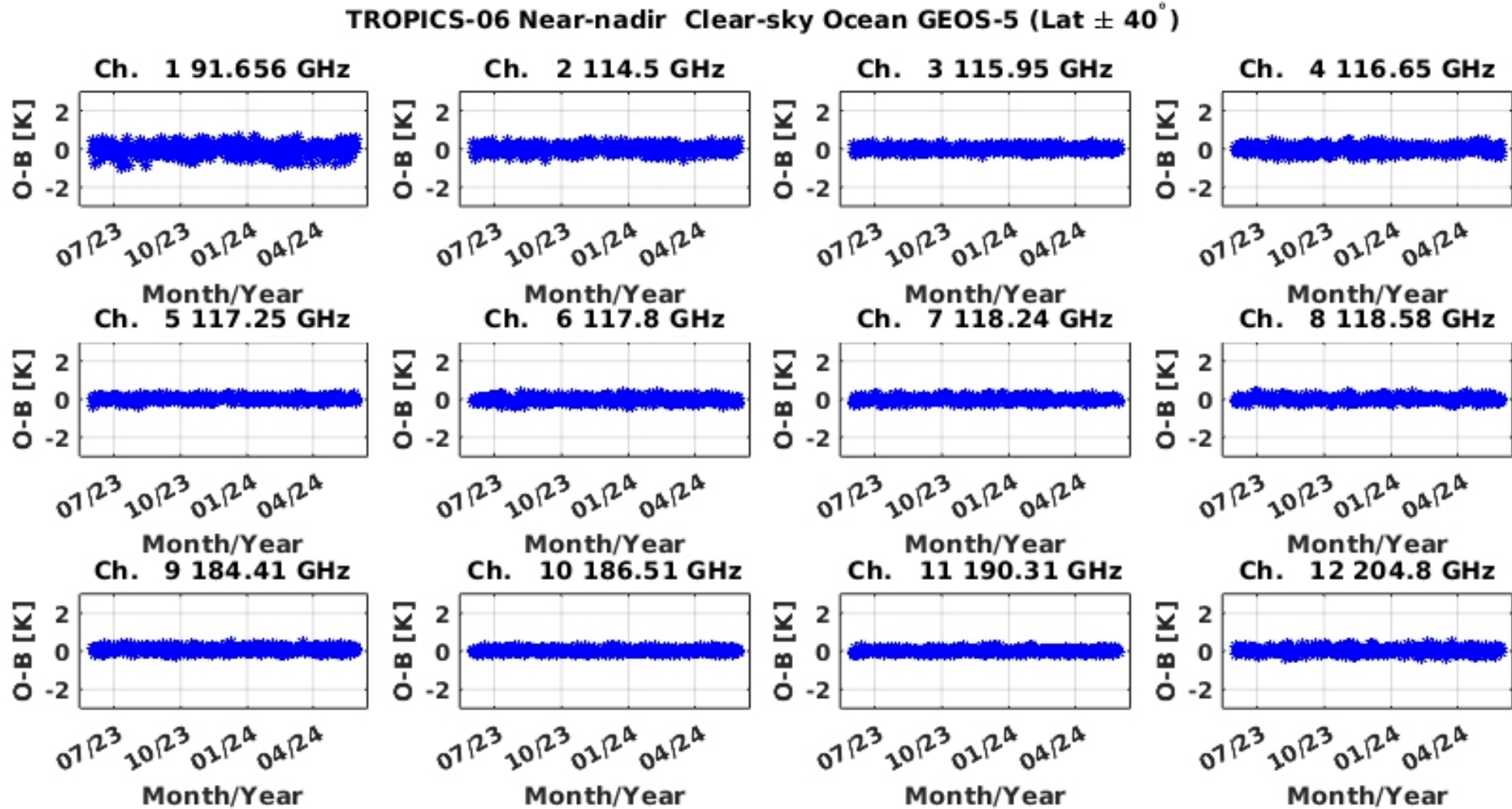
Preparing for GES DISC



DAAC public release



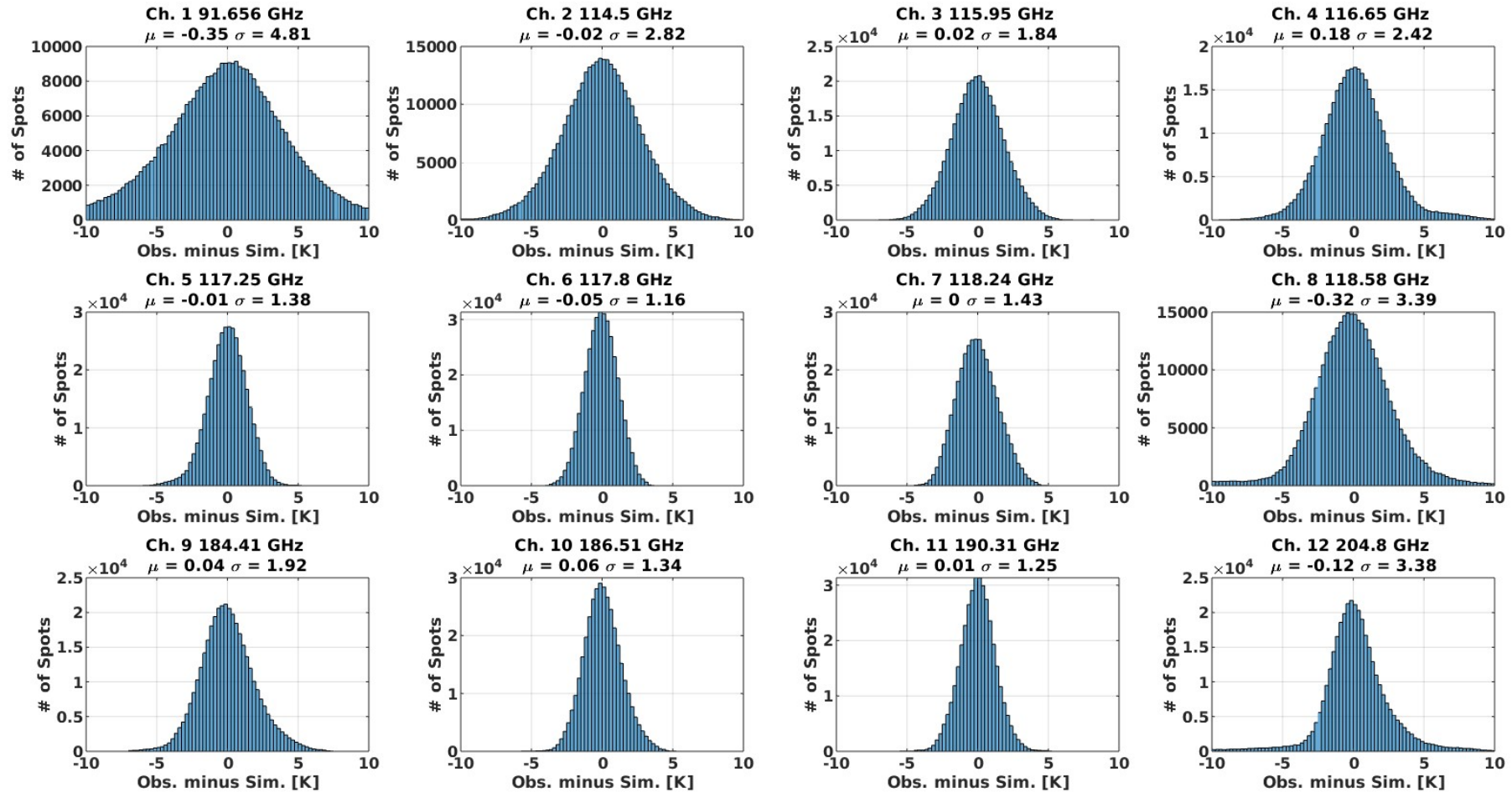
# TROPICS Calibration is Very Stable Over 1 Year





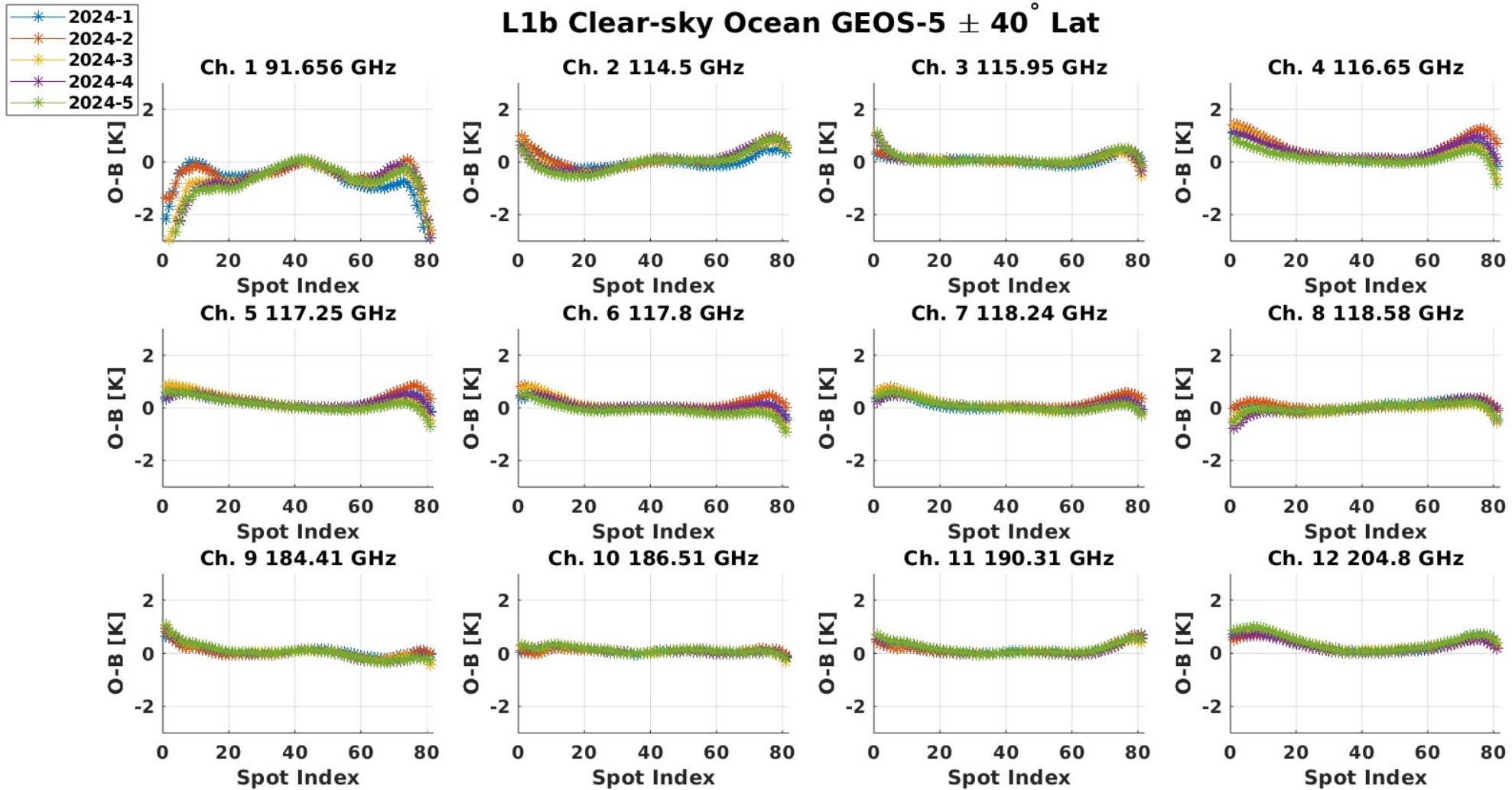
# TROPICS Calibration Agrees Very Well with GEOS-5

TROPICS-03 Near-nadir Clear-sky Ocean (June 2023 to May 2024)  $\pm 15^\circ$  Scan Angle  $\pm 40^\circ$  Lat.



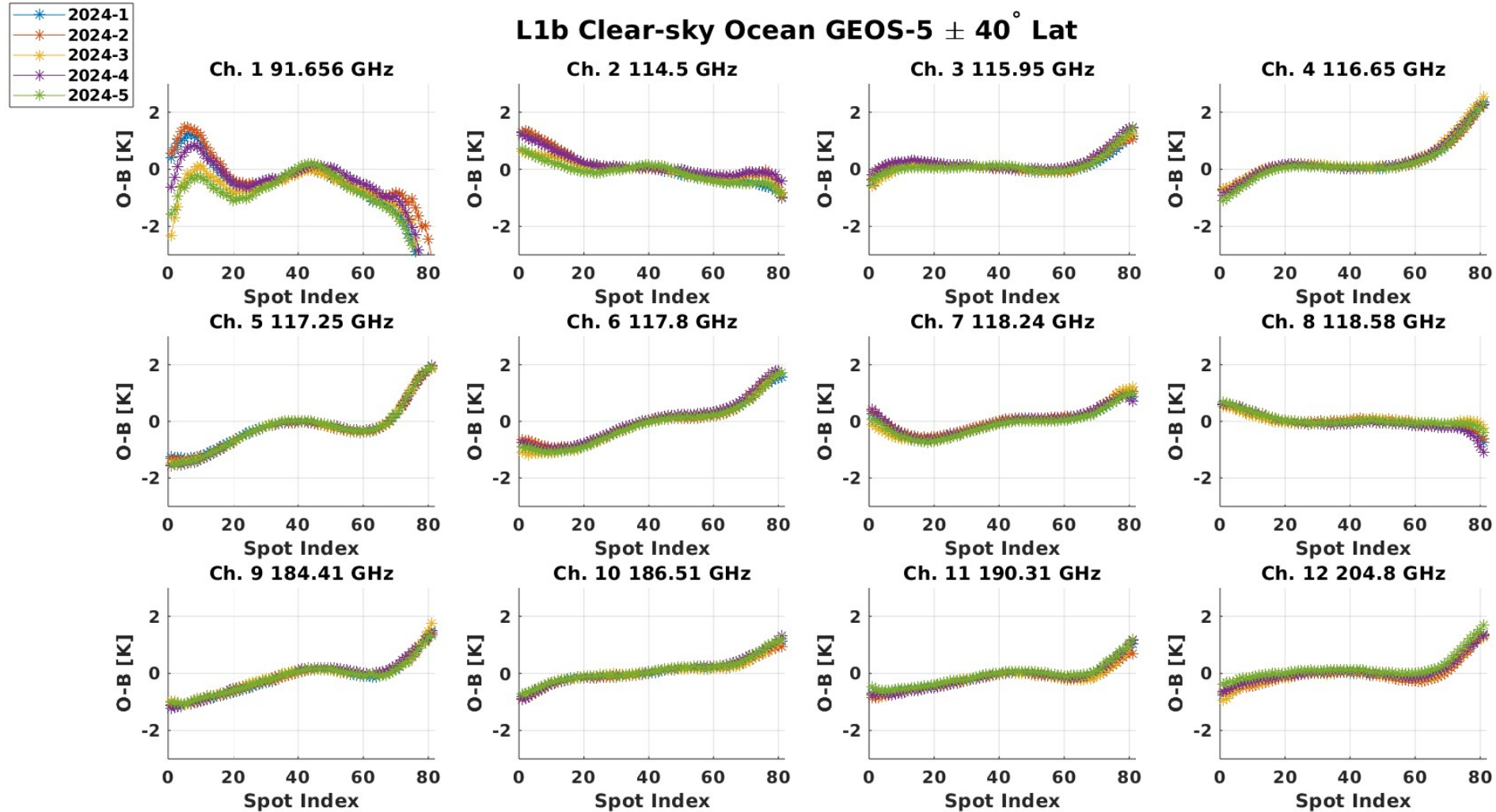


# TROPICS-06: Very Small Scan Bias



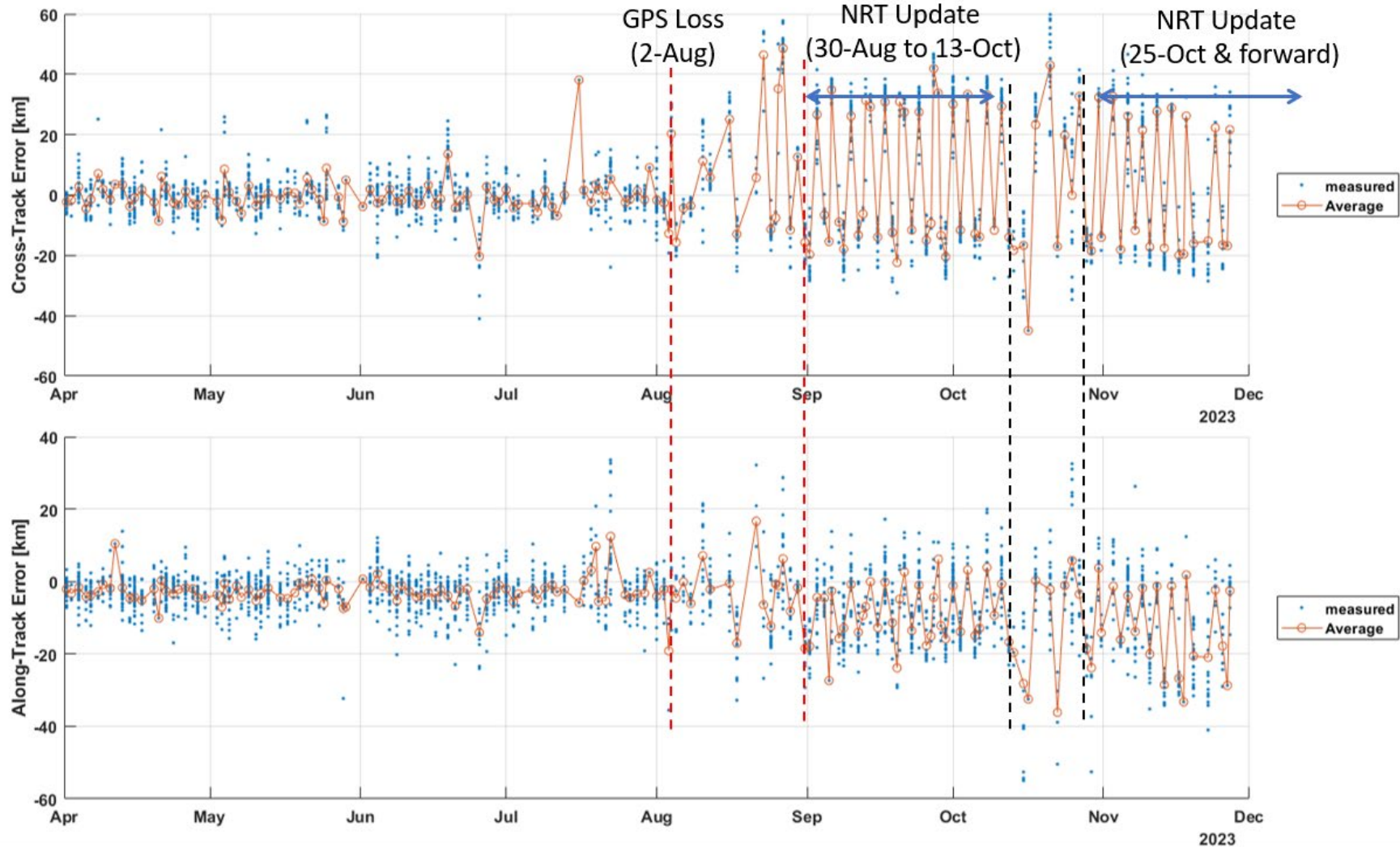


# TROPICS-03: Larger Scan Bias to Work On





# Trending Pathfinder Geolocation Error



**Coastline inflection Point  
at Red Sea**