Jason 3 and Sentinel-6 Michael Freilich Tandem Phase

Instrument Processing:
Propagation, Wind Speed and Sea State Bias

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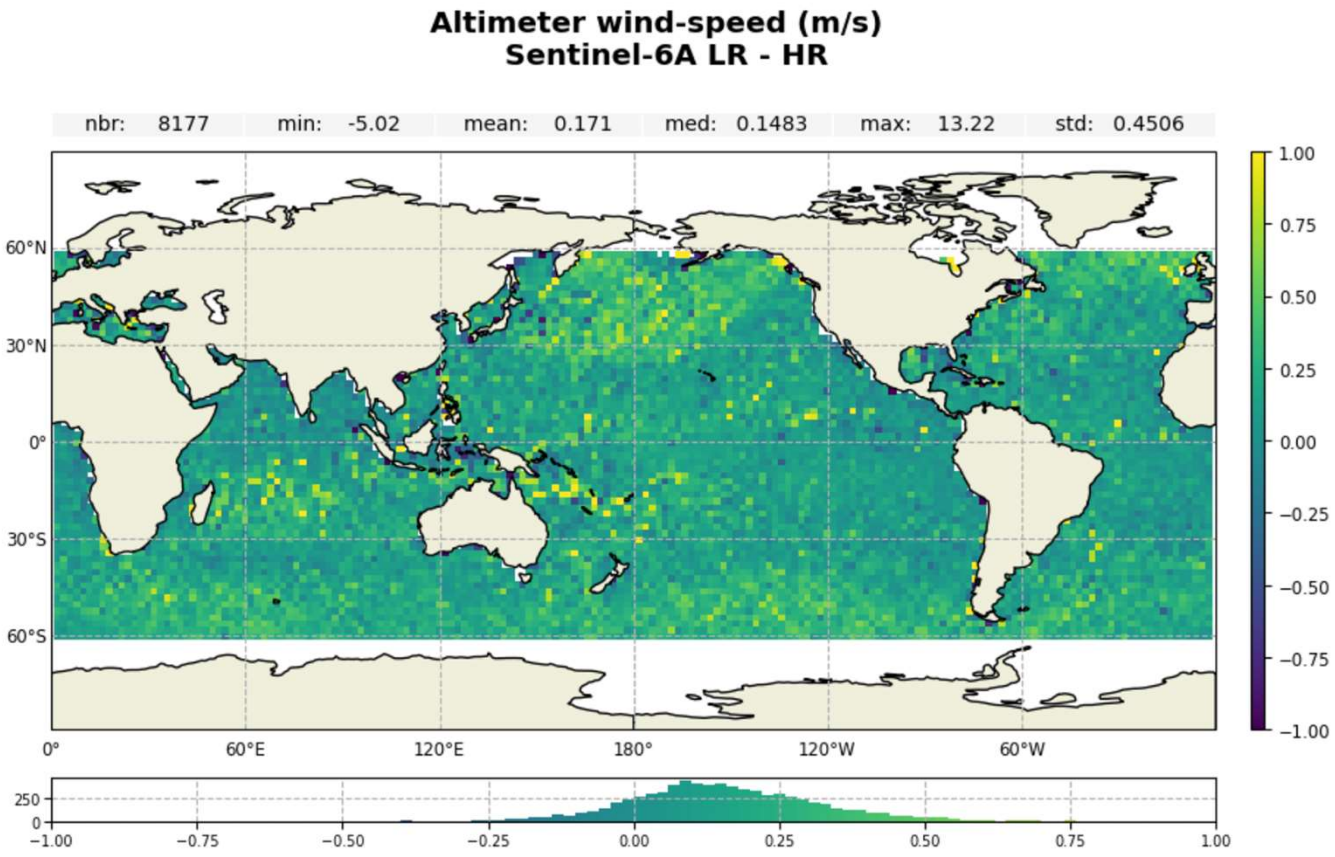
1. Key results for wind, SSB and corrections

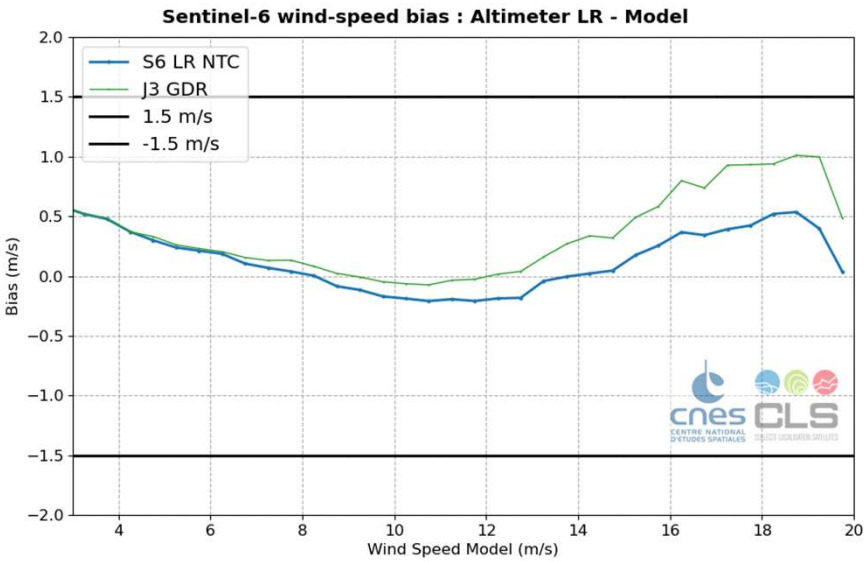
Results extracted from cyclic reports produced by CNES and available here: https://eumetsatspace.atlassian.net/wiki/spaces/PQ/pages/1773928450/Sentinel-6+cyclic+reports

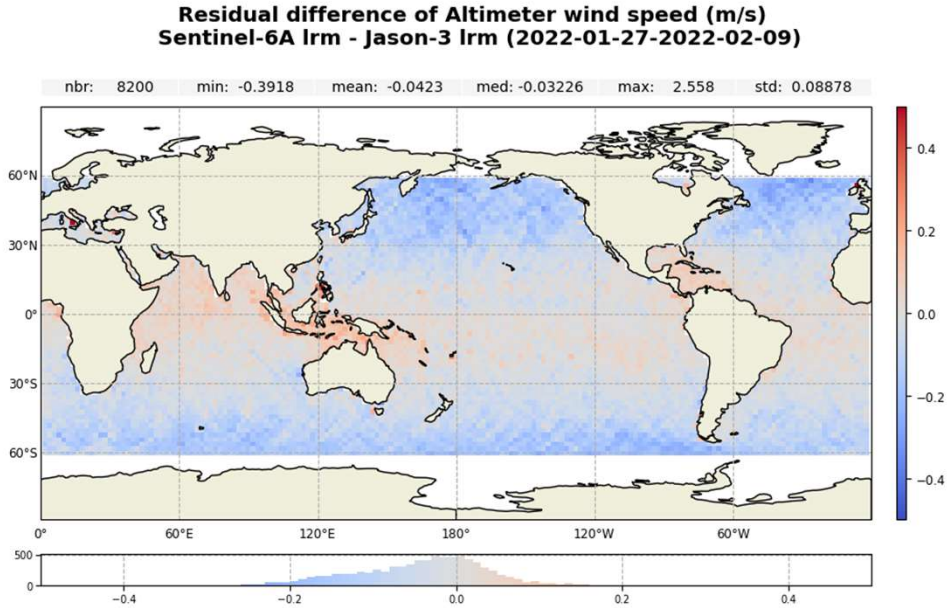
Wind speed – S6HR vs S6LR



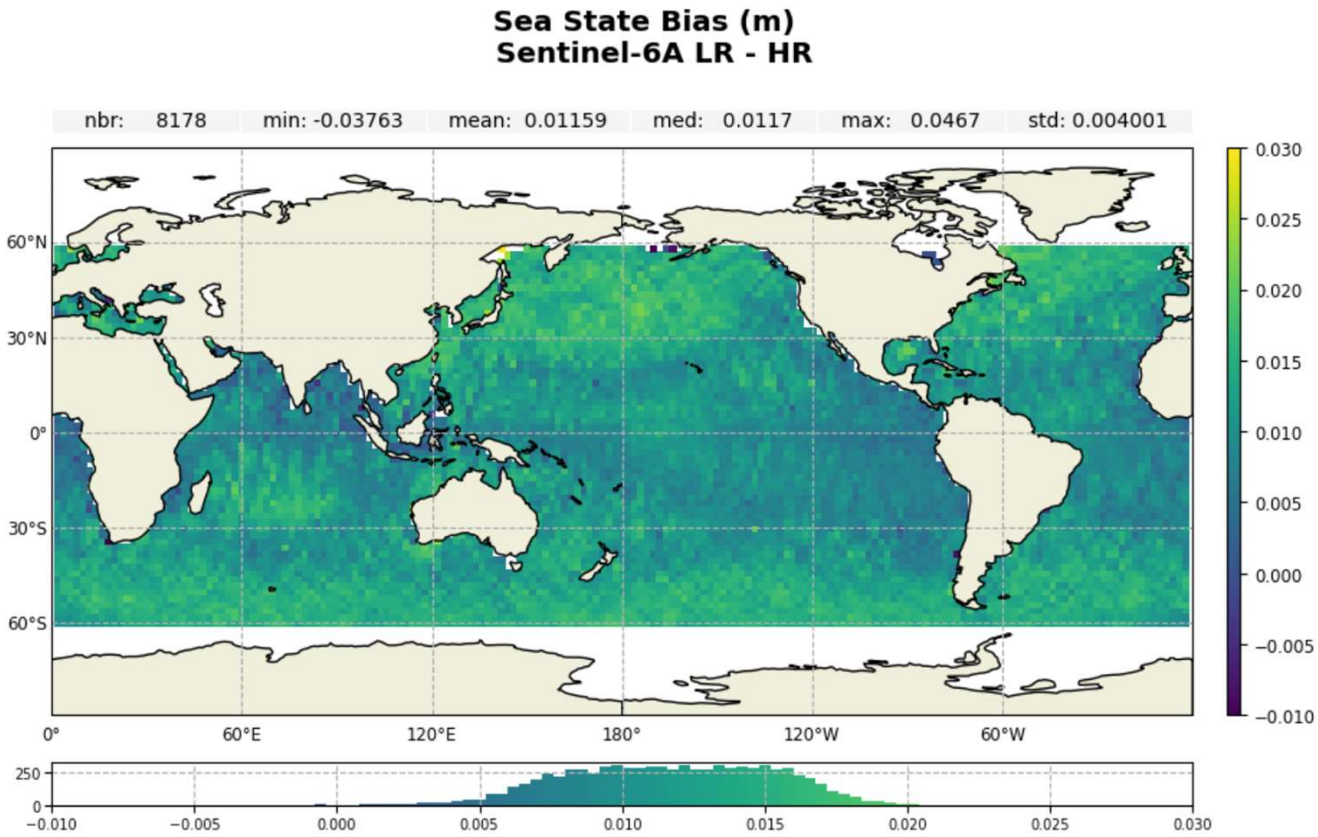
Wind speed – S6LR vs J3

- Collard wind model for both S6 and J3
- S6 in line with J3 (bias < 5 cm/s)



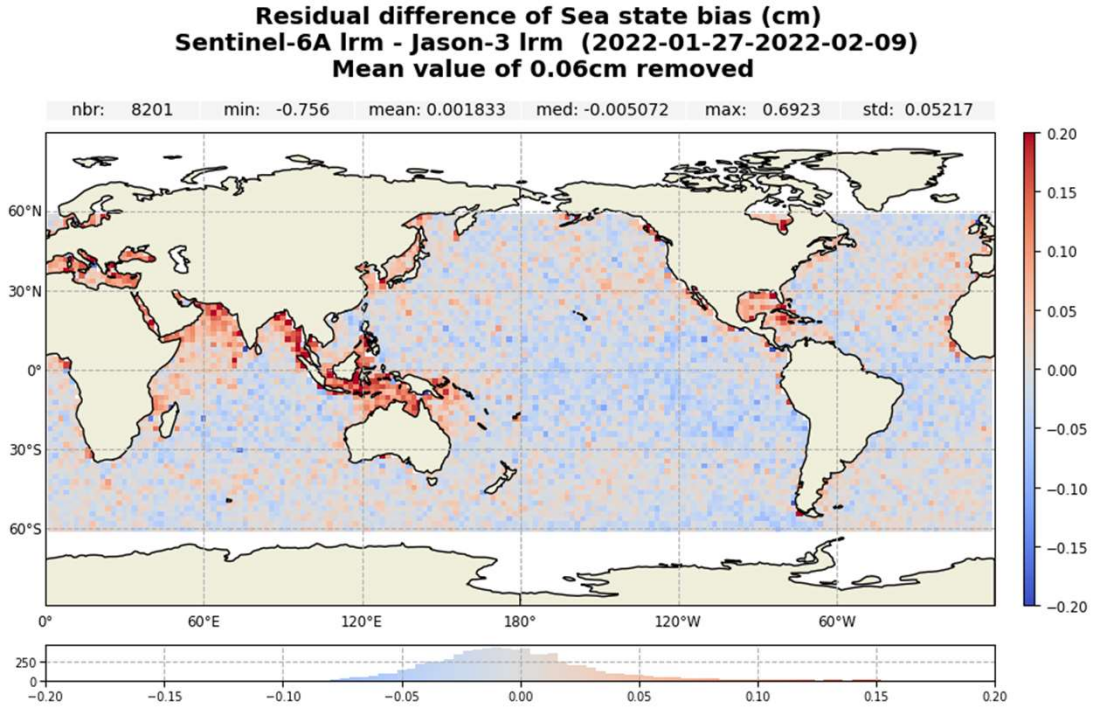


SSB – S6HR vs S6LR



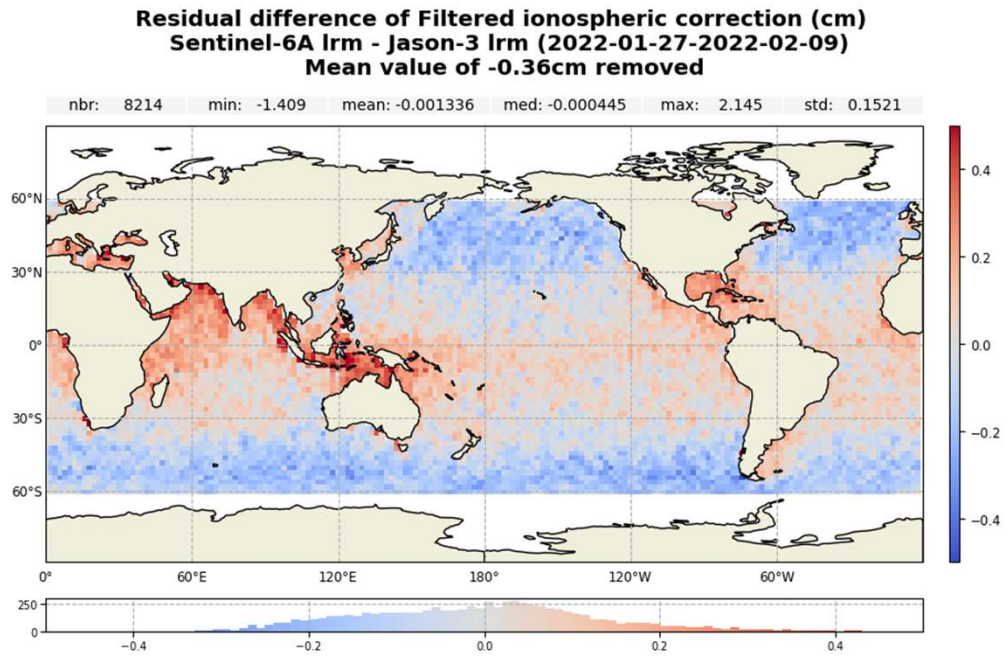
SSB – S6LR vs J3

- S6 and J3 share the same J3 GRD-F SSB
  - ✓ <cm bias
  - ✓ Small discrepancies in bloom regions



Ionospheric correction – S6LR vs J3

- Ionospheric correction
  - ✓ In line with J3
  - ✓ <cm bias

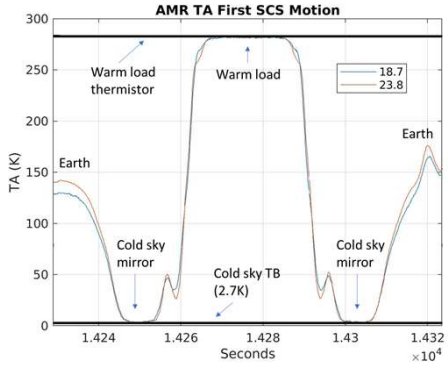


2. AMR-C and HRMR performances and evolutions

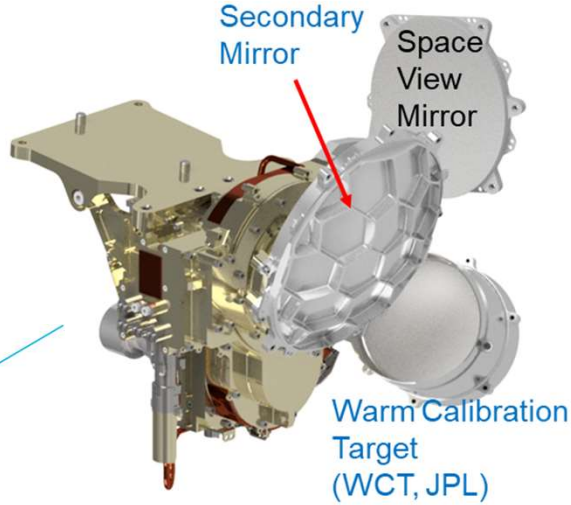
AMR-C Performance (Wet Path Delay)

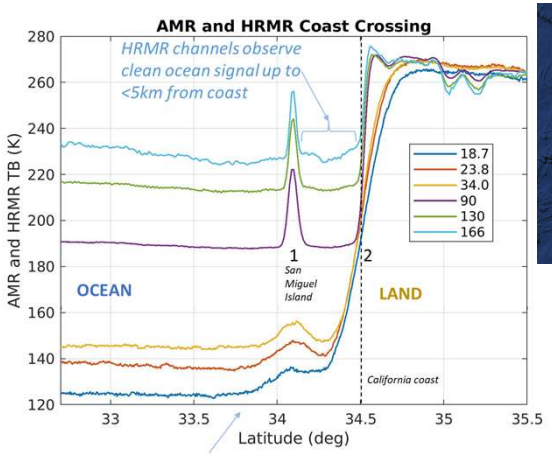
- AMR-C responsible for providing wet tropospheric path delay on Sentinel-6
- AMR-C includes two innovations from prior generation AMR
  - Supplemental Calibration System (SCS) – *maintain mm/yr stability*
  - High Resolution Microwave Radiometer (HRMR) – *provide coastal path delay to 1cm at 10km from land*

Jason-3 AMR



Sentinel-6 AMR-

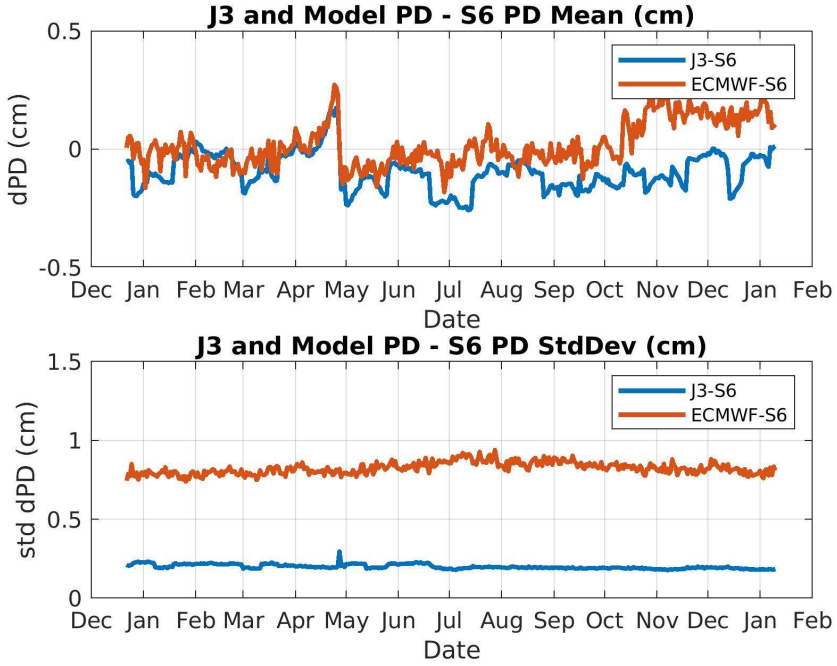


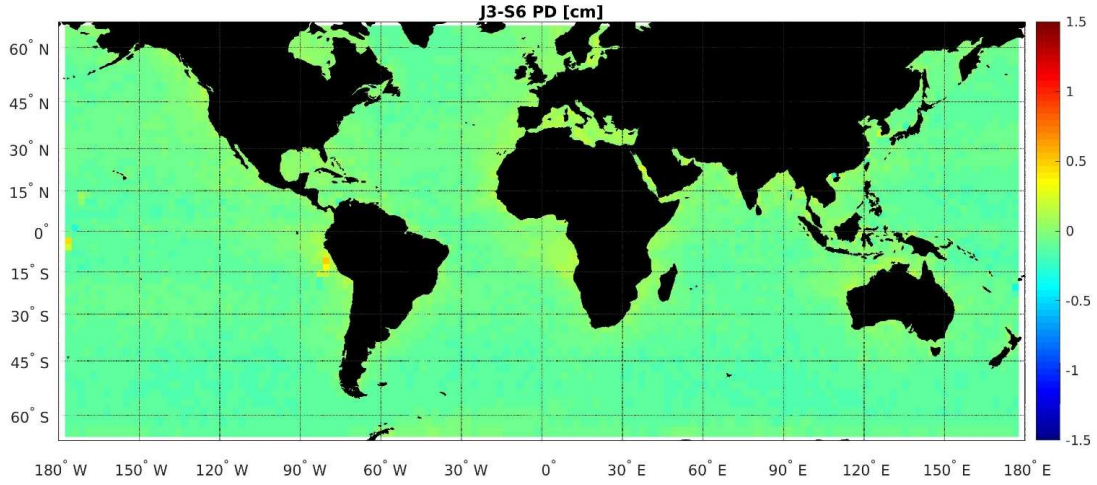


HRMR

SCS

AMR-C compared to Jason-3





- SCS provides operational calibration updates every 5 days
- Overall mission calibration update delivered Jan 31, 2022

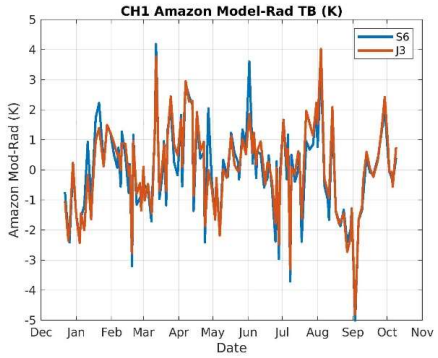
- Difference between J3 and S6 at mm-level after post-launch calibration

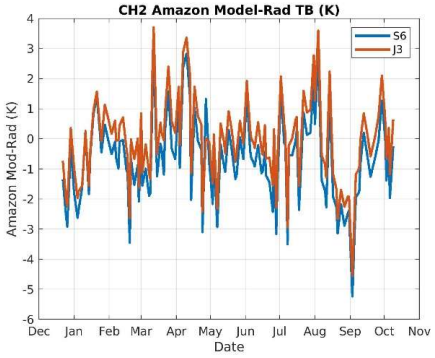
- S6 AMR-C stable to + 1mm relative to J3 and ECMWF (0.7mm 1-sigma, daily avg)

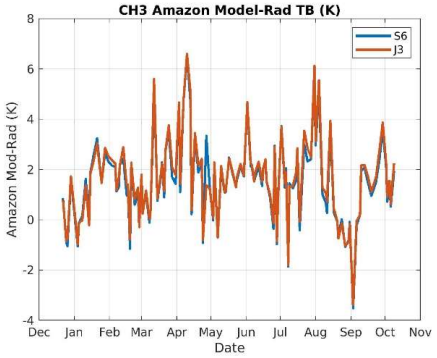
Independent On-Earth References

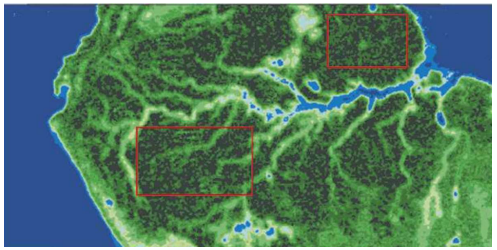
- On-Earth references were basis for radiometer calibration in prior missions, but are now **independent sources** for Sentinel-6
- **No detectable drift** within uncertainty of each reference

Amazon Rainforest Reference

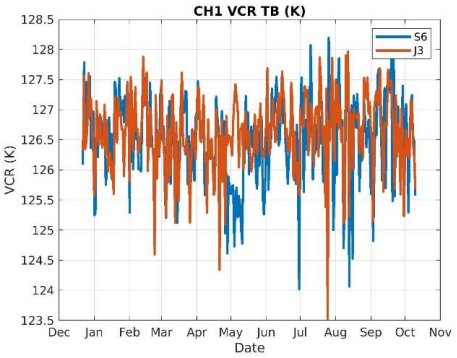


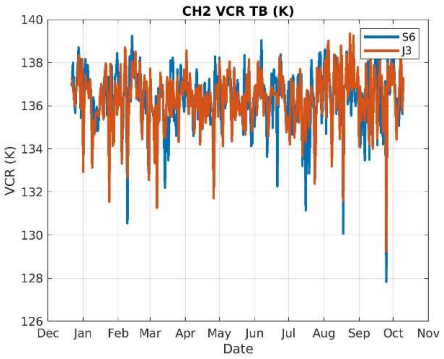


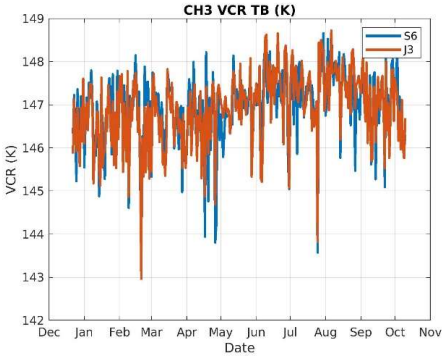




Ocean Reference

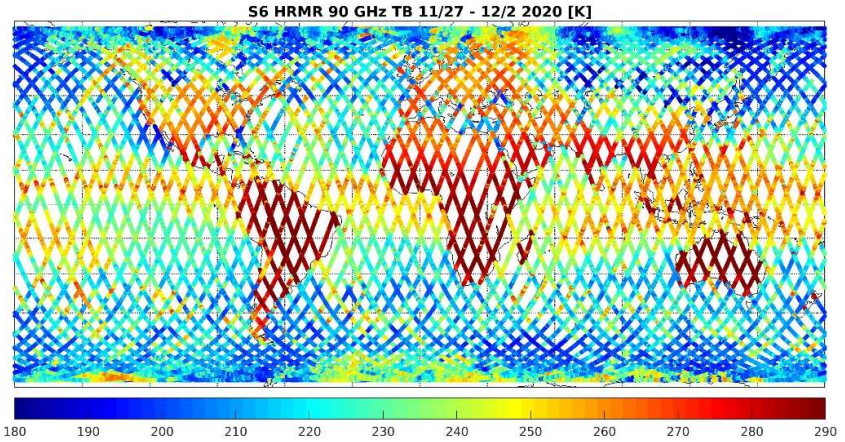


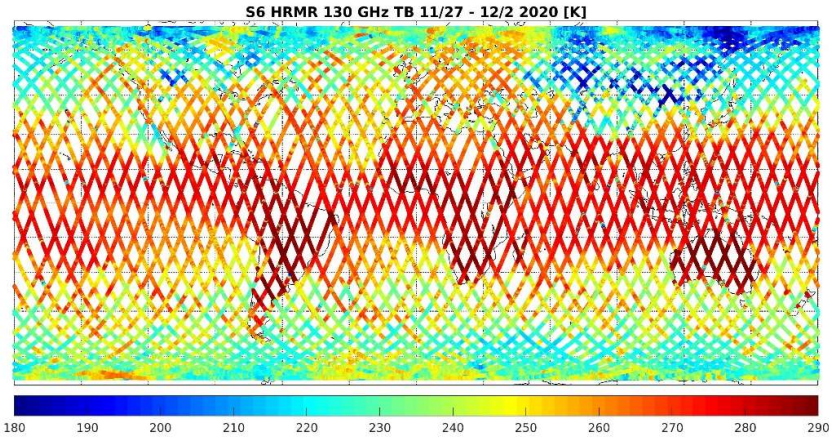


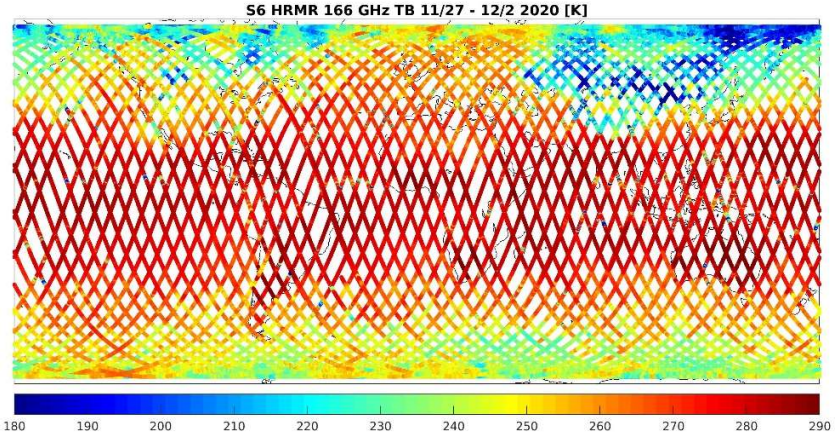


HRMR Performance

- HRMR performing nominally to date
- Observes at 90, 130 and 166 GHz with 5km spatial resolution
- Data used to extend wet path delay measurement to within 10km from land

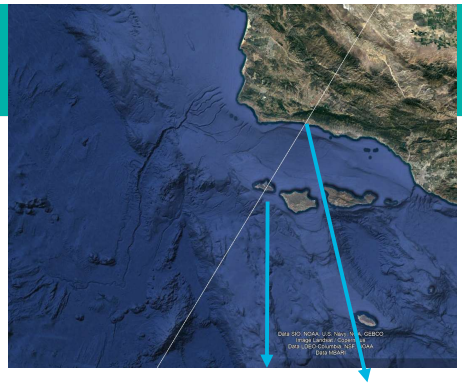


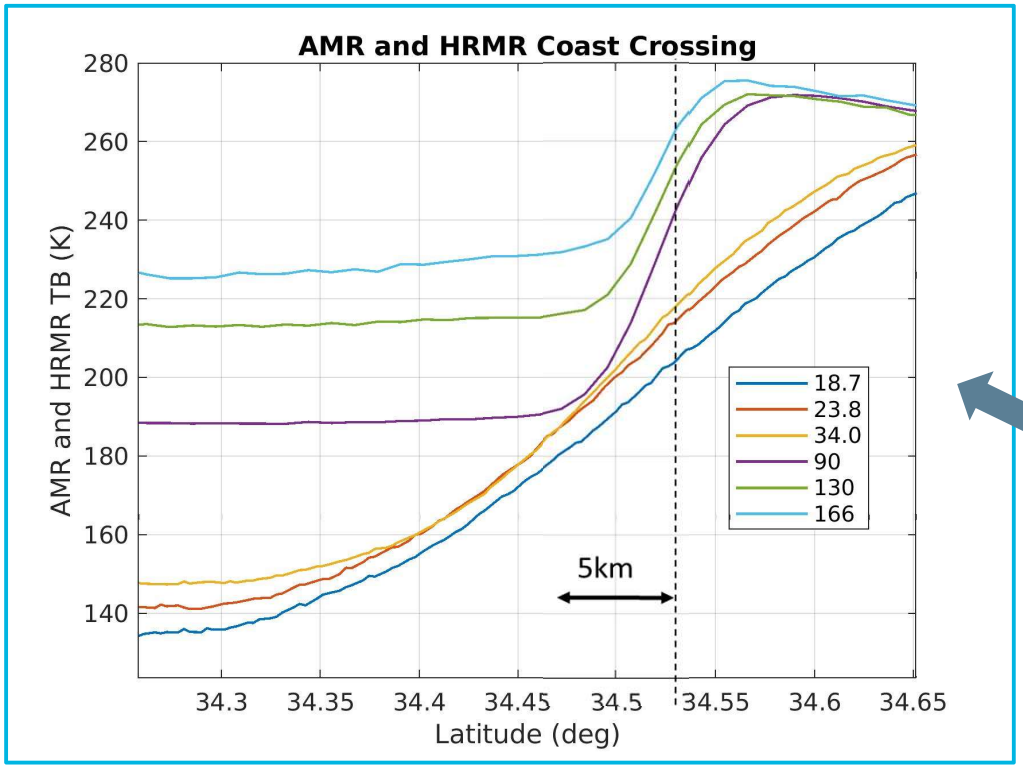


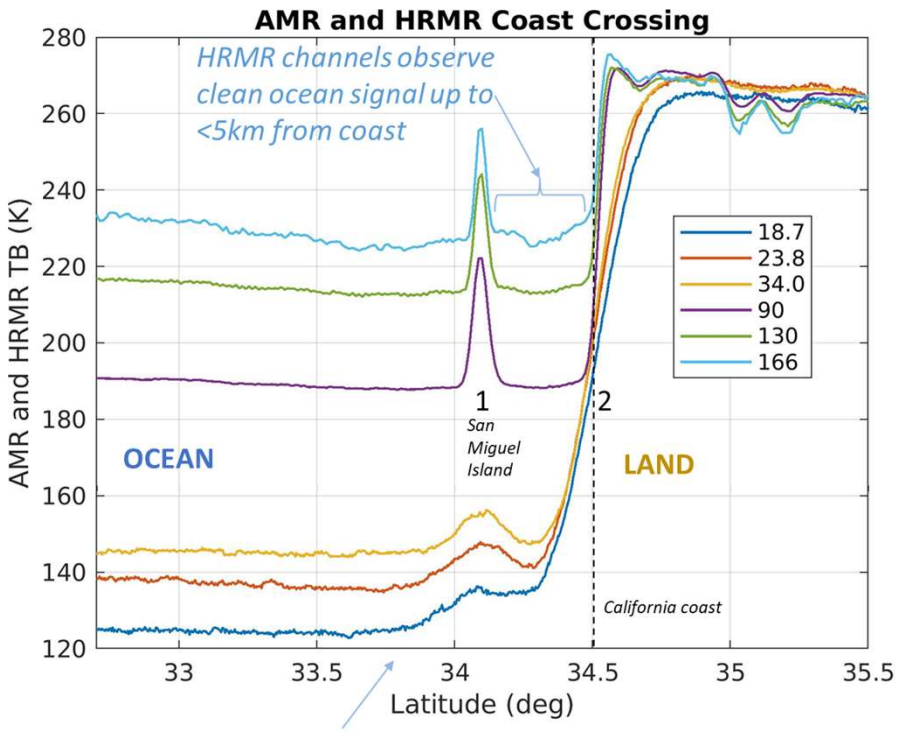


HRMR Performance

HRMR free from land contamination up to 5km from coast



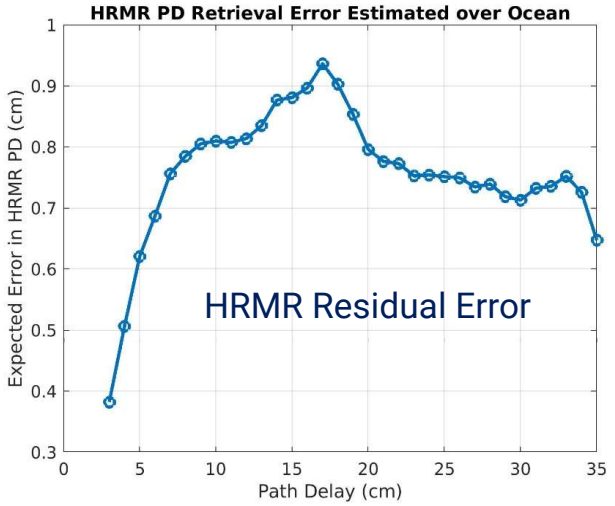


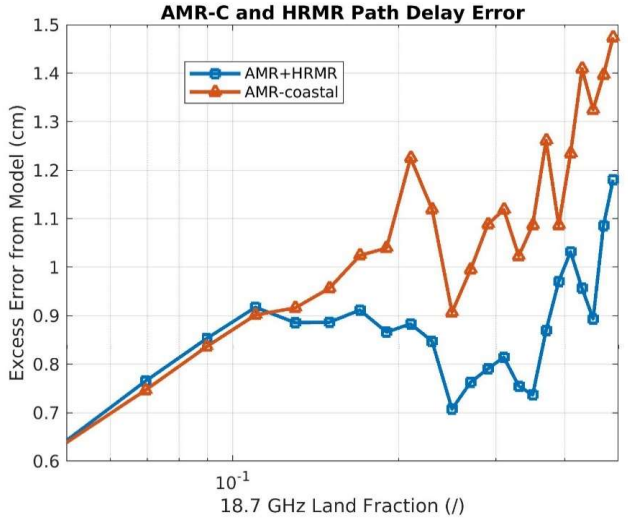


AMR-C channels first impacted by land contamination ~65km from coast

HRMR Performance

- HRMR algorithm uses high-frequency TB variation and first guess PD from AMR-C to provide retrieval to coastline
  - ✓ L1B algorithm implemented and validated in processing system at JPL
  - ✓ L2 in final validation stages in preparation for delivery at end of March
- HRMR performance analysis shows PD retrieval uncertainty <1cm to within 5km from land
- Upwards of a 50% reduction in variance from existing AMR-only coastal product





Future evolutions related to AMR-C and HRMR products

- AMR-C calibration update for complete mission reprocessing provided on January 31, 2022
  - Includes updates to SCS calibration source temperature models based on special cal/val data acquired
  - Results in minor (< 1 mm) changes to calibration over first year

- Next version of radiometer processor planned for 2022 to include HRMR coastal path delays
  - HRMR information will be in radiometer wet tropospheric correction field when land flag indicates “coastal processing”

Thank you!

Questions are welcome.