



# BBR Geolocation Accuracy

*Edward Baudrez*

*Royal Meteorological Institute of Belgium*

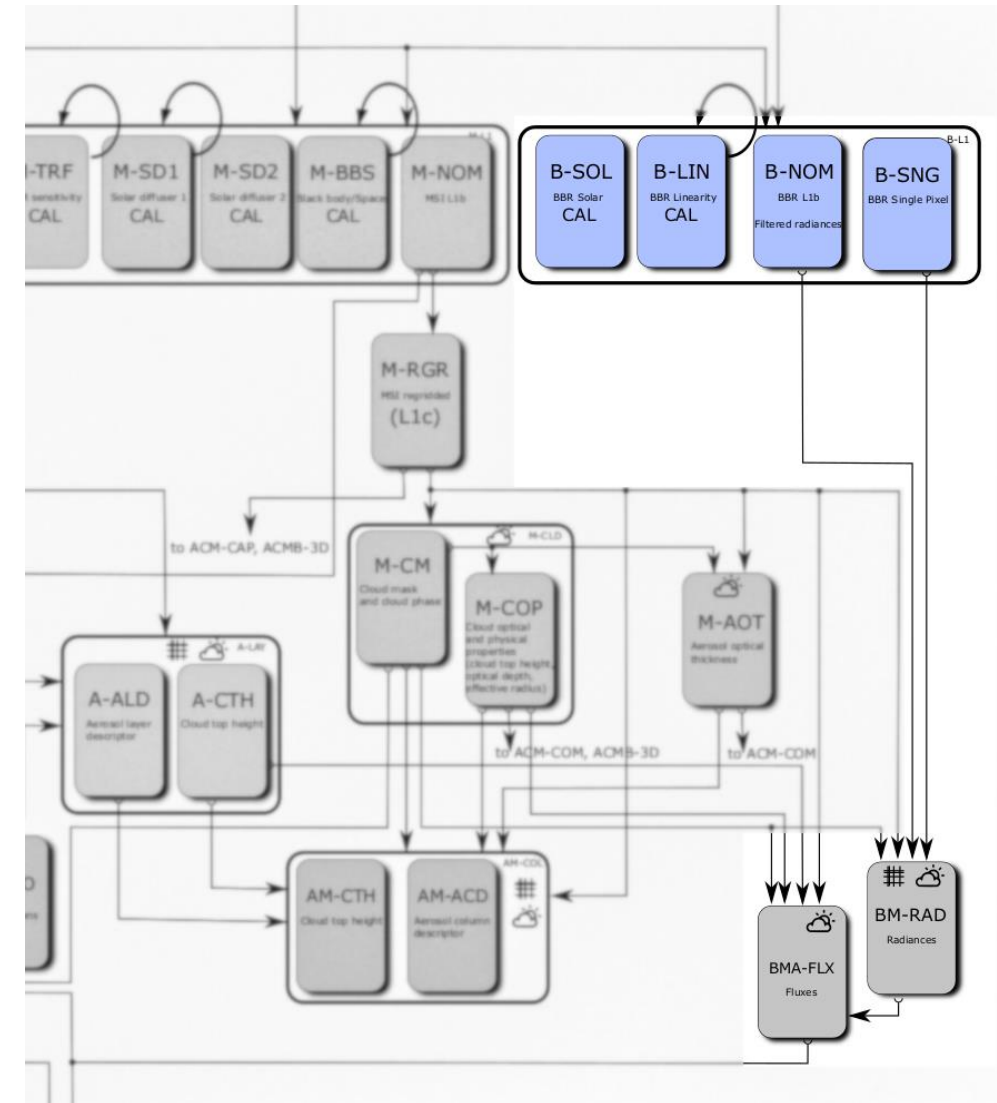
1<sup>st</sup> ESA-JAXA EarthCARE In-Orbit Validation Workshop  
14 – 17 January 2025 | VIRTUAL EVENT

# BBR L1 geolocation: introduction

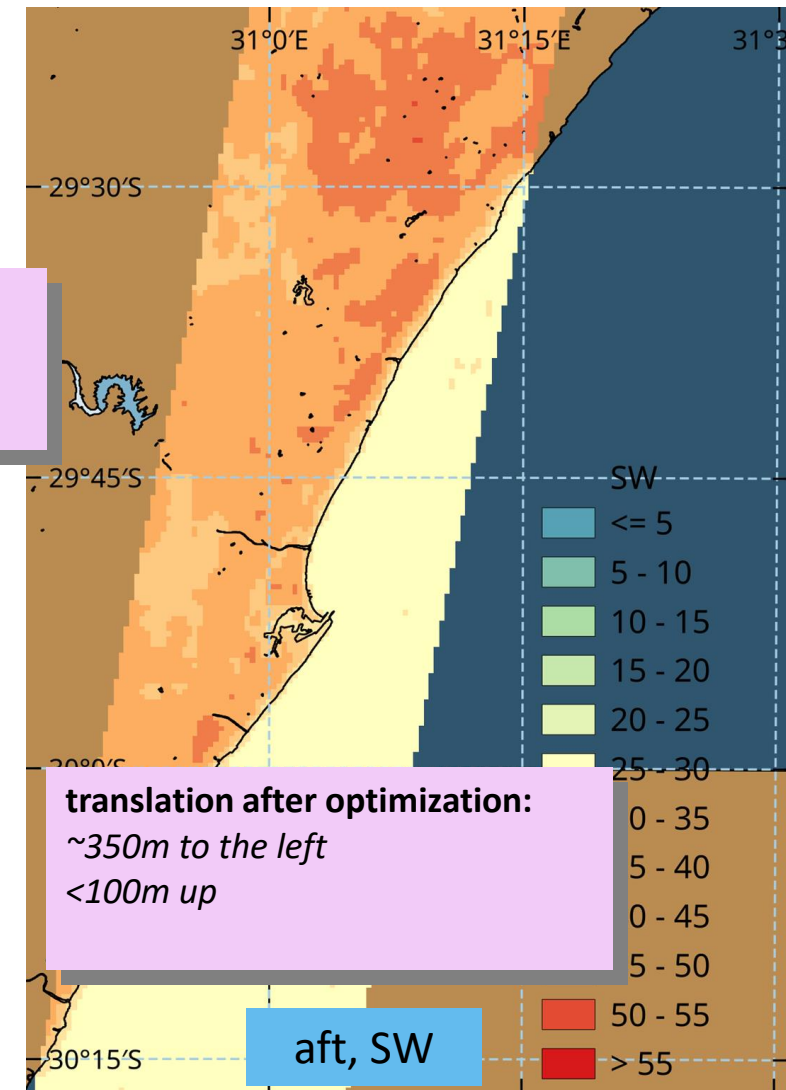
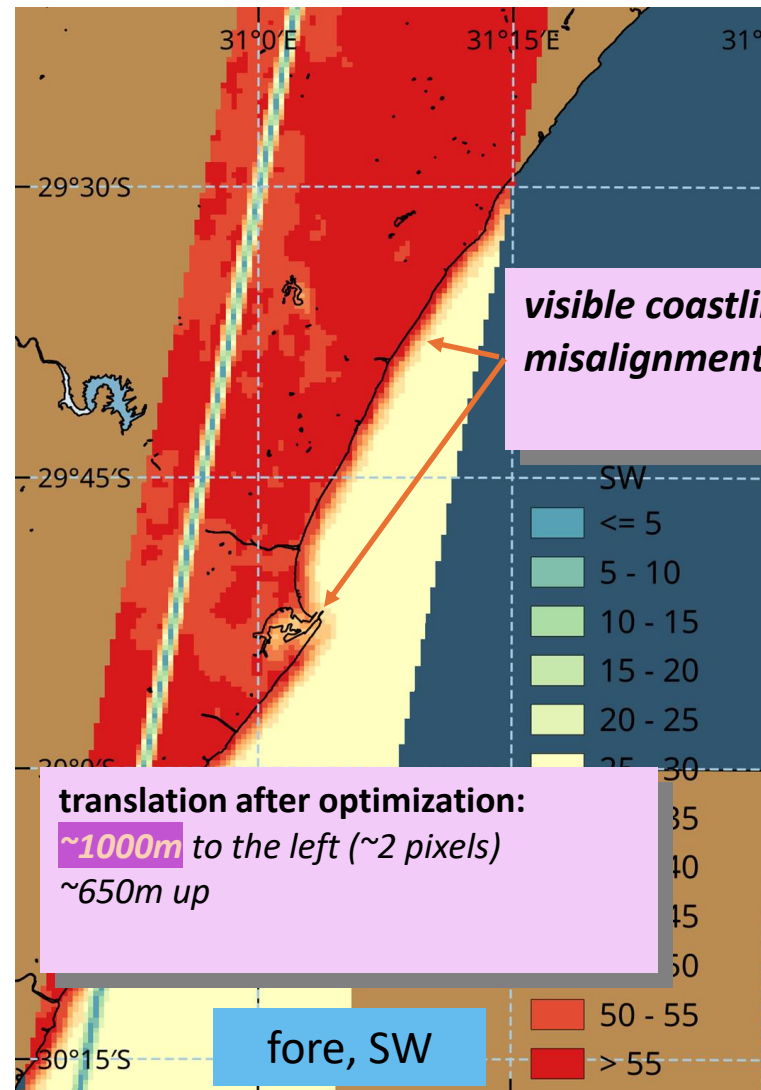
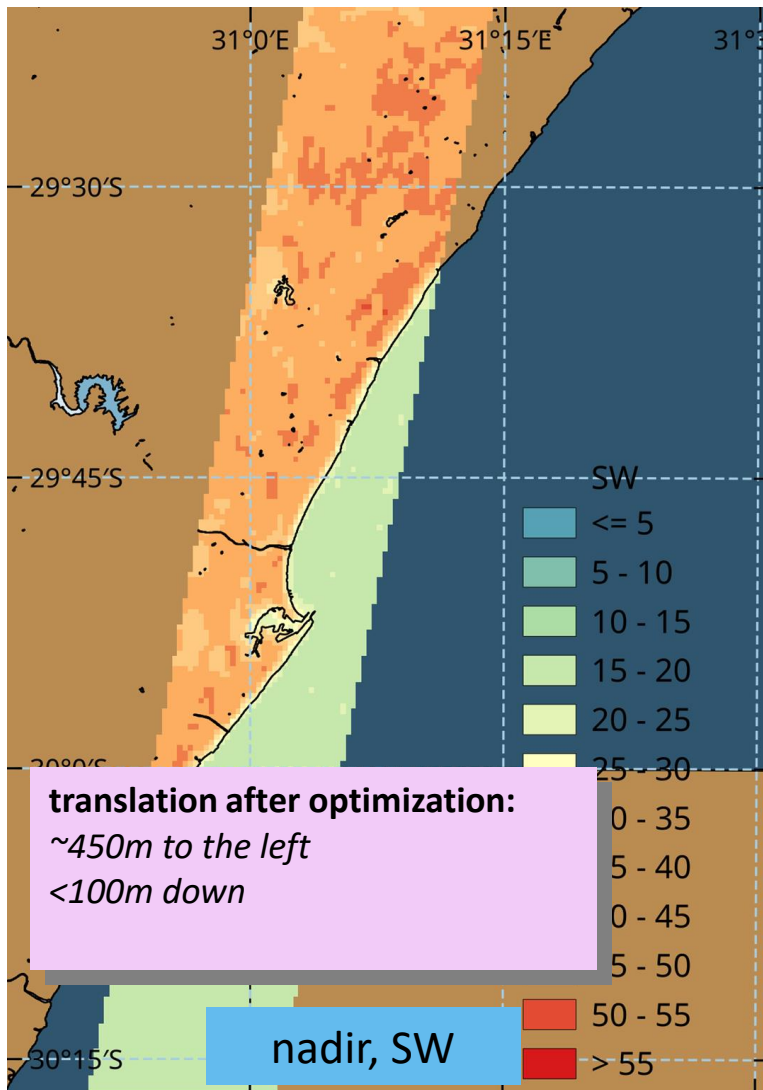


- Basic product = B-SNG L1b (BBR Single Pixel product)
  - = two-dimensional (filtered) (shortwave + total wave) radiance data
- All other BBR products are derived from it:
  - B-NOM L1b (integration of B-SNG)
  - BM-RAD L2b (unfiltered radiances)
  - BMA-FLX L2b (fluxes)

⇒ Importance of geolocation of B-SNG !

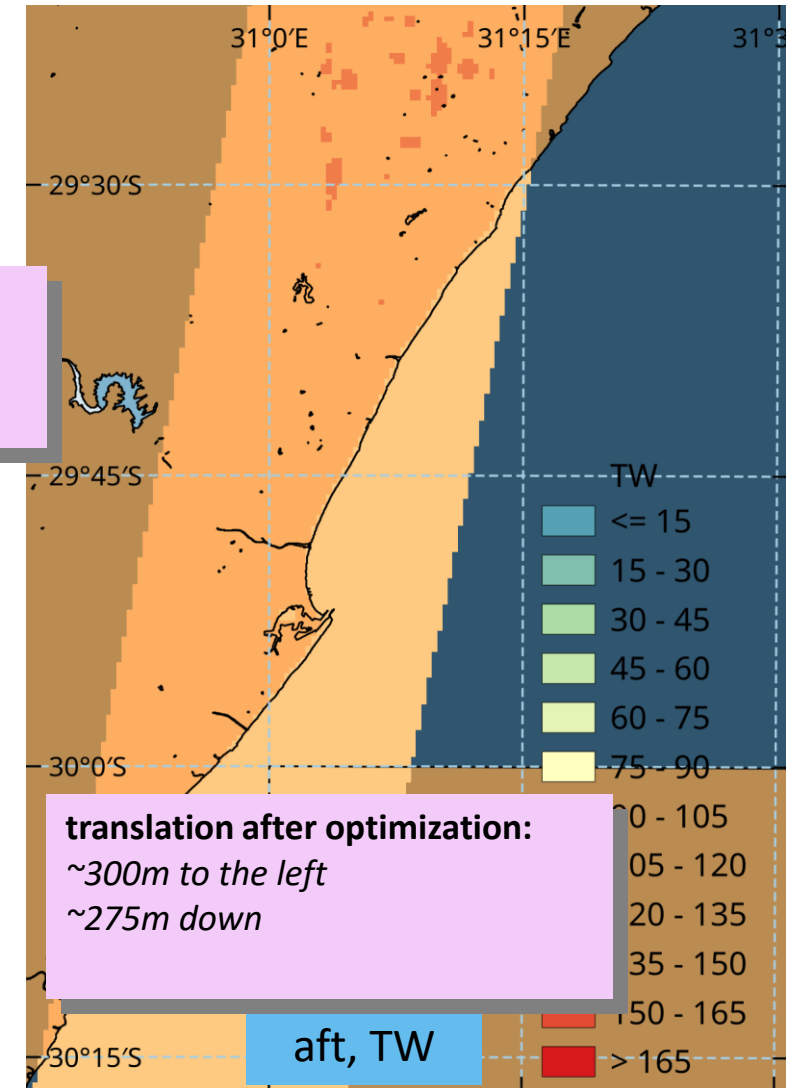
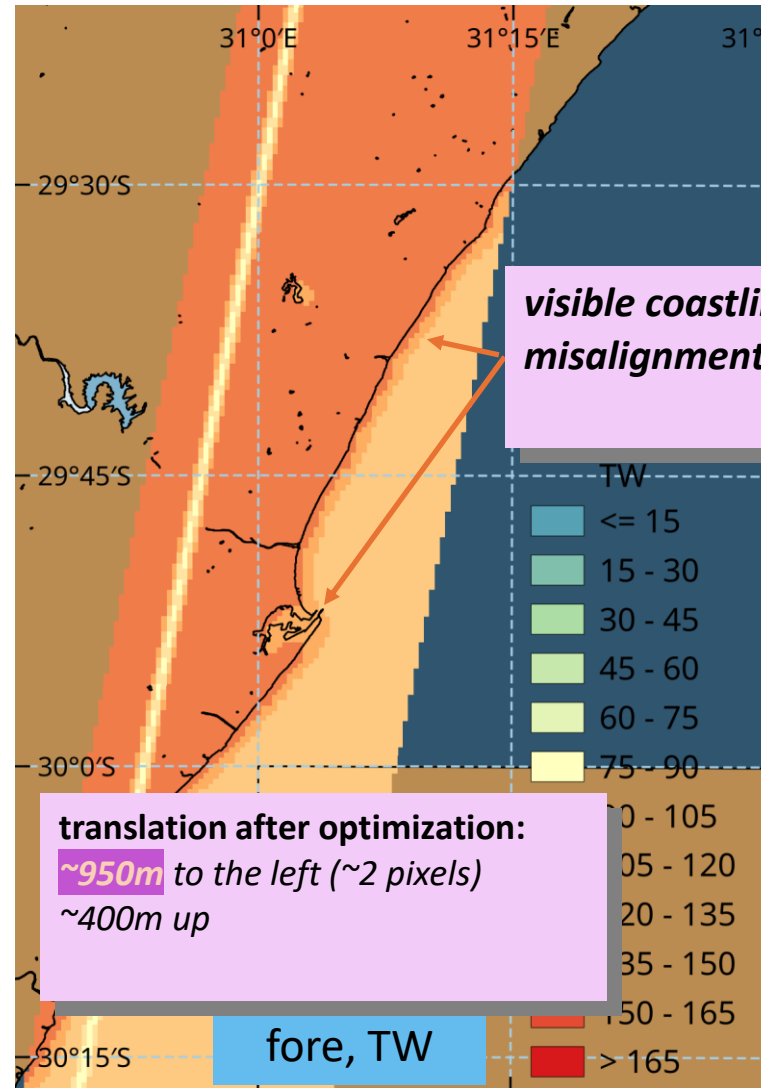
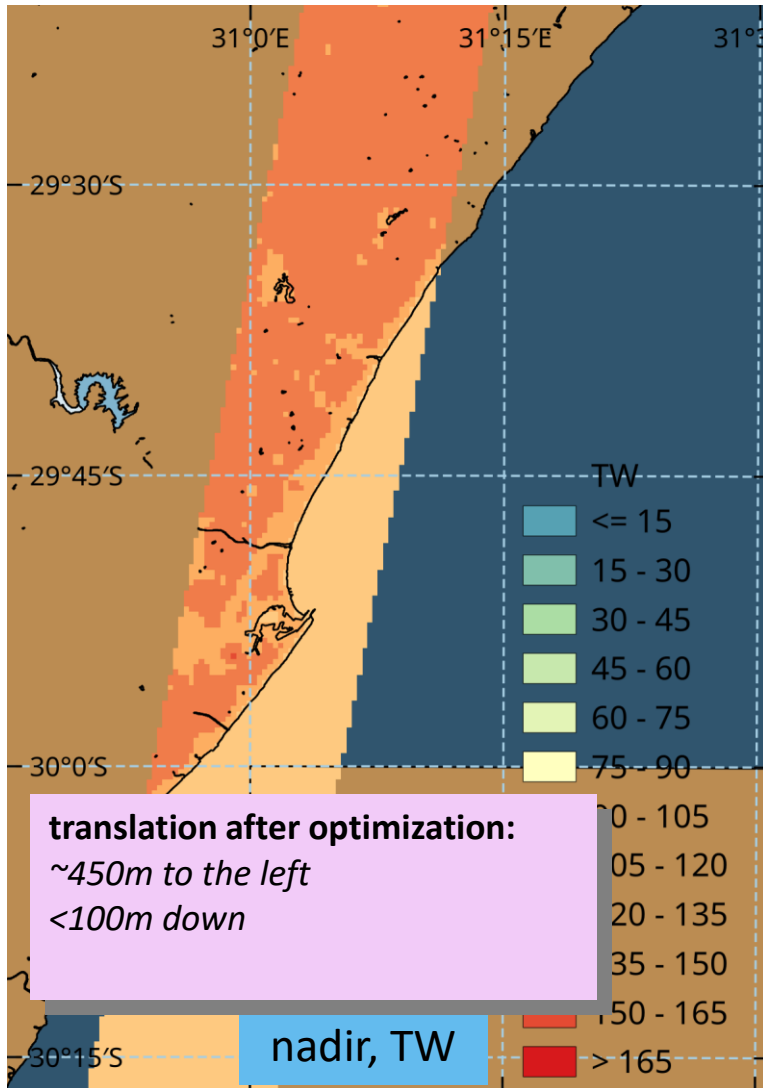


# Example: B-SNG filtered shortwave



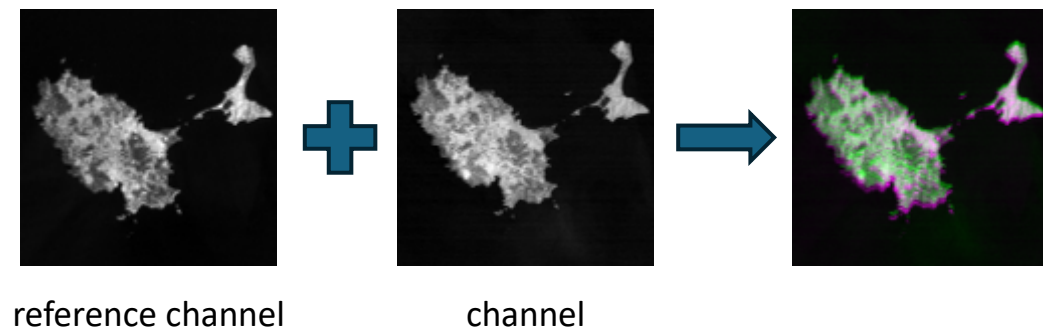
B-SNG frame: 01517F (2024-09-03 11:39:22 UTC), scene is South Africa, descending mode (baseline AC)

# Example: B-SNG filtered total wave



B-SNG frame: 01517F (2024-09-03 11:39:22 UTC), scene is South Africa, descending mode (baseline AC)

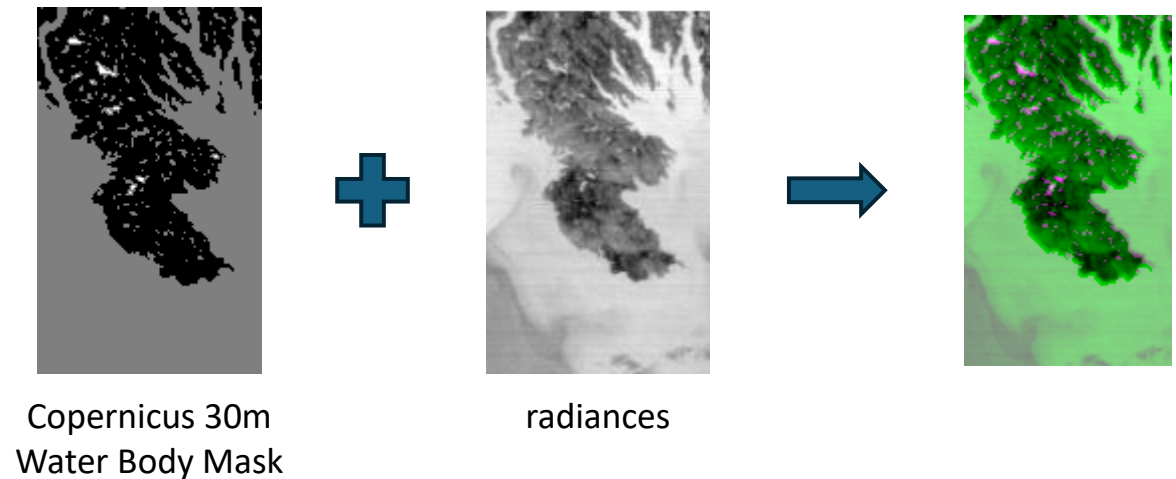
- Evaluate registration between two images = intensity-based image registration
- Input = reference + 'observation'
- Optimization algorithm that maximizes Mutual Information (MI) metric ( $\approx$  similarity between images that are not necessarily linearly correlated)
- The output of the optimization = translation of observation to match reference image



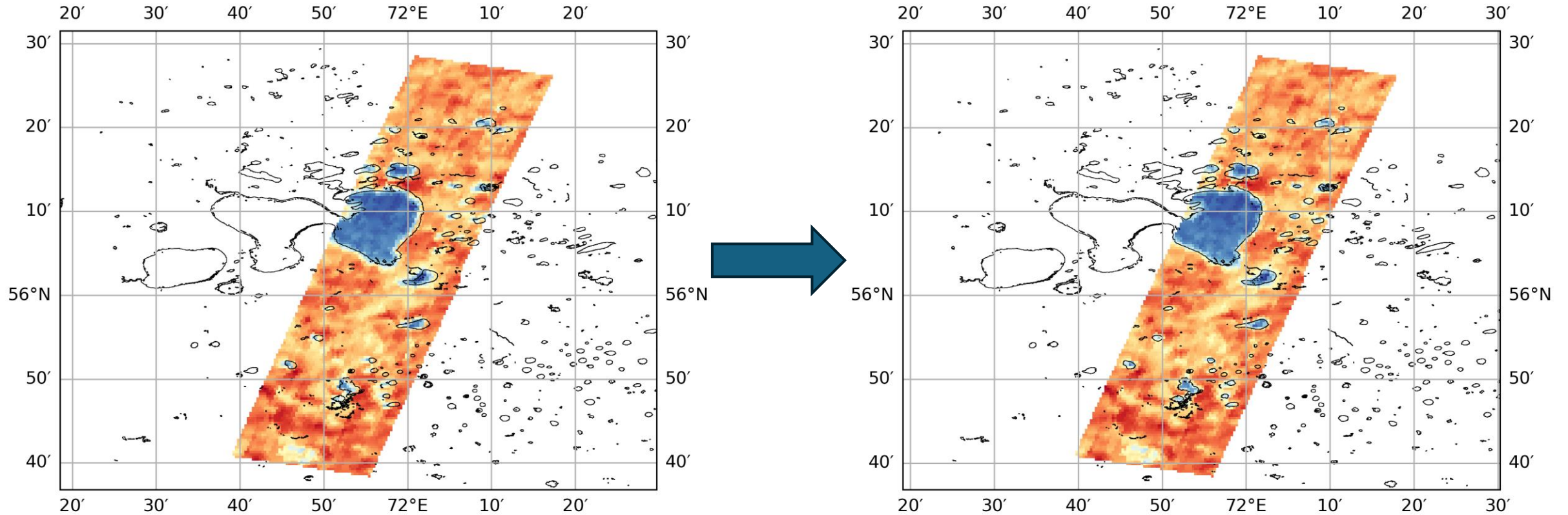
# Registration method: adaptation



- Registration tool can be used to evaluate registration of B-SNG data with a high-resolution water-body mask data source, with high spatial accuracy
- Used here: Copernicus GLO-30 water body mask data at 1" resolution (~30m spatial resolution, accuracy <10m)



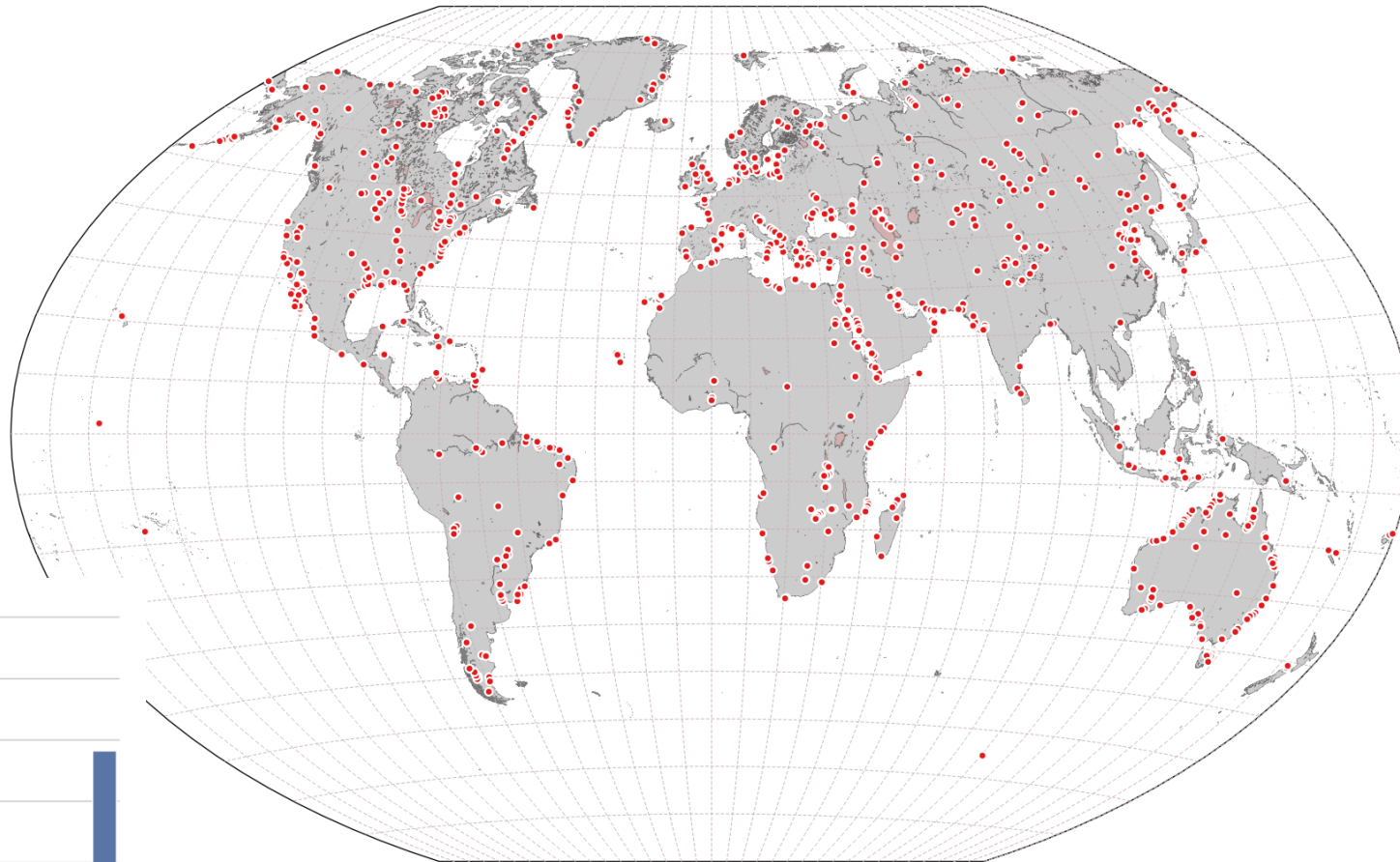
# Example of method application



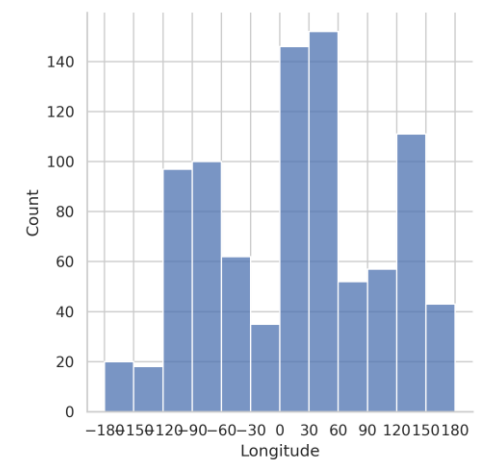
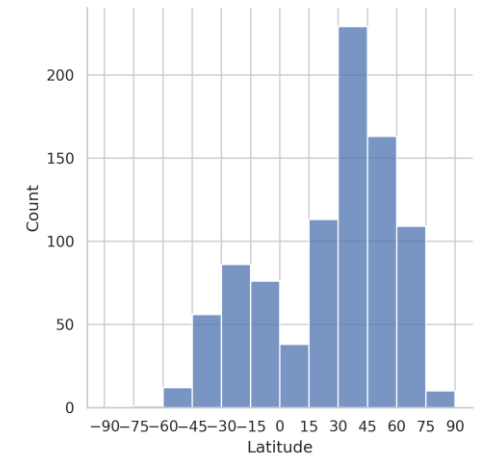
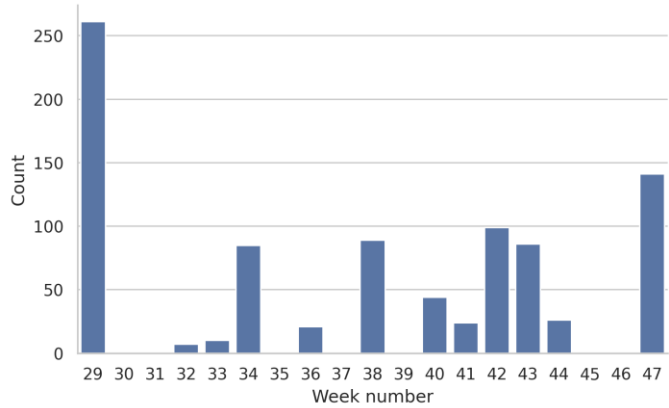
contours = reference = Copernicus GLO-30 Water Body Mask (~30m spatial resolution)

B-SNG frame 2014D (baseline AC), nadir, SW (= descending orbit)  
rectified grid, 500 m, Hotine Oblique Mercator, grid azimuth 14.52°  
along-track correction: 165 m to the North (= backwards w.r.t. direction of flight)  
cross-track correction: 558 m to the East

# Scene distribution



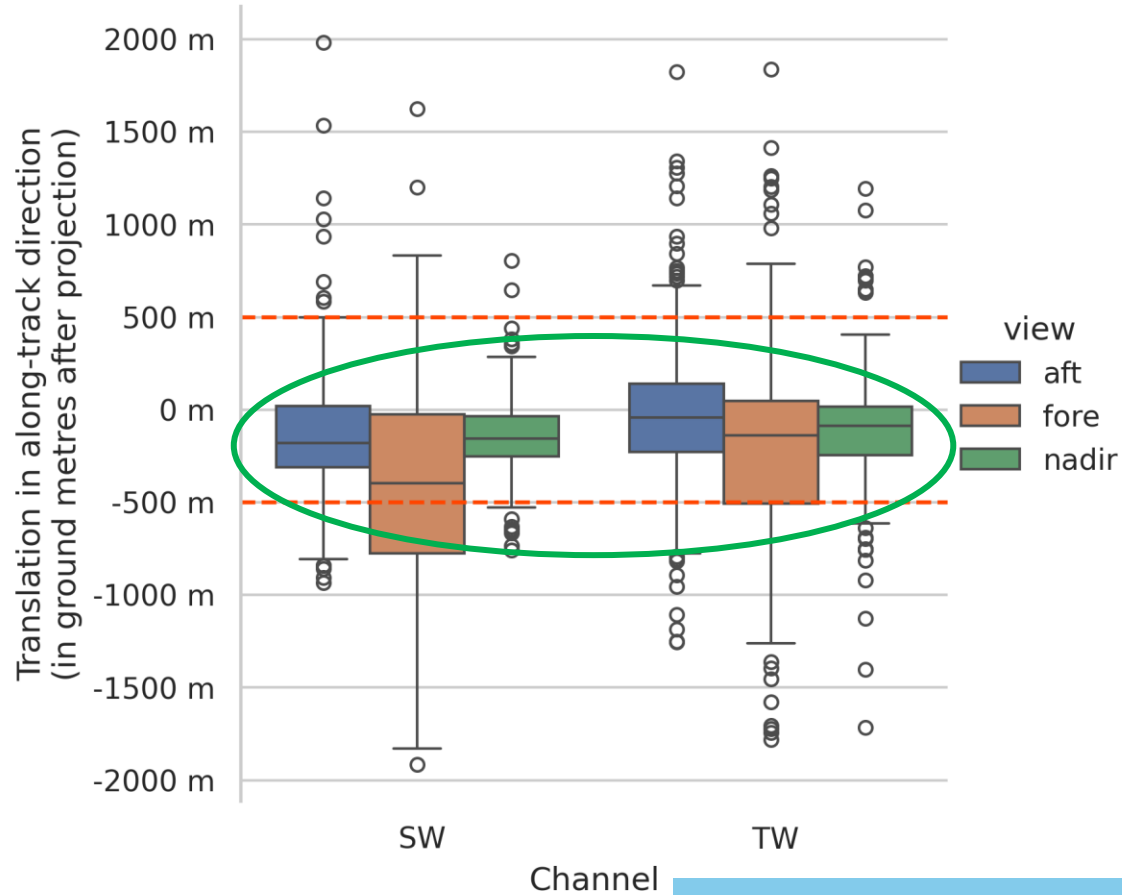
893 scenes, 336 frames, 144 orbits,  
18 July – 24 November



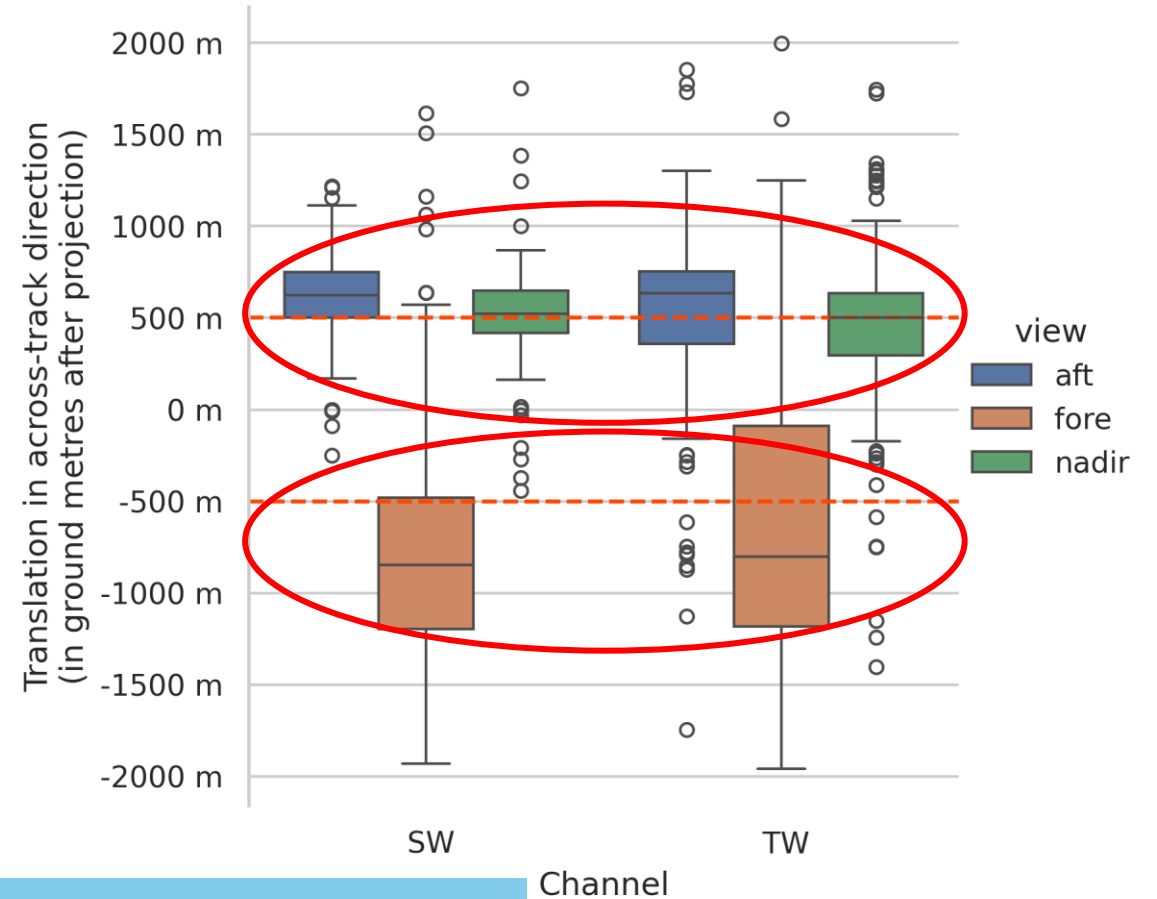


# B-SNG geolocation accuracy

Translation in along-track direction after optimization  
(projection = Hotine Oblique Mercator, grid spacing = 500 m)  
Channel needs to be shifted ahead by...



Translation in across-track direction after optimization  
(projection = Hotine Oblique Mercator, grid spacing = 500 m)  
Channel needs to be shifted to the left by...



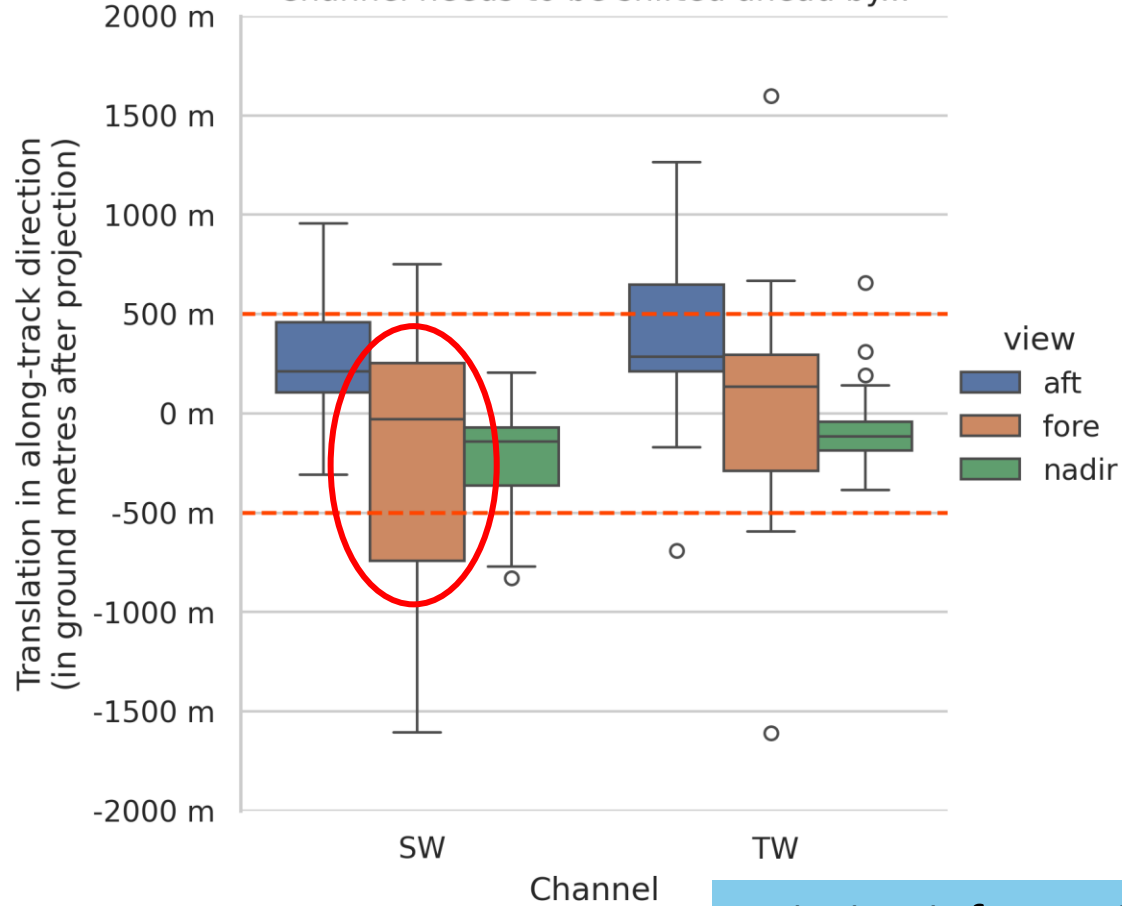
*baseline AC = last complete reprocessing*

# B-SNG geolocation accuracy: update

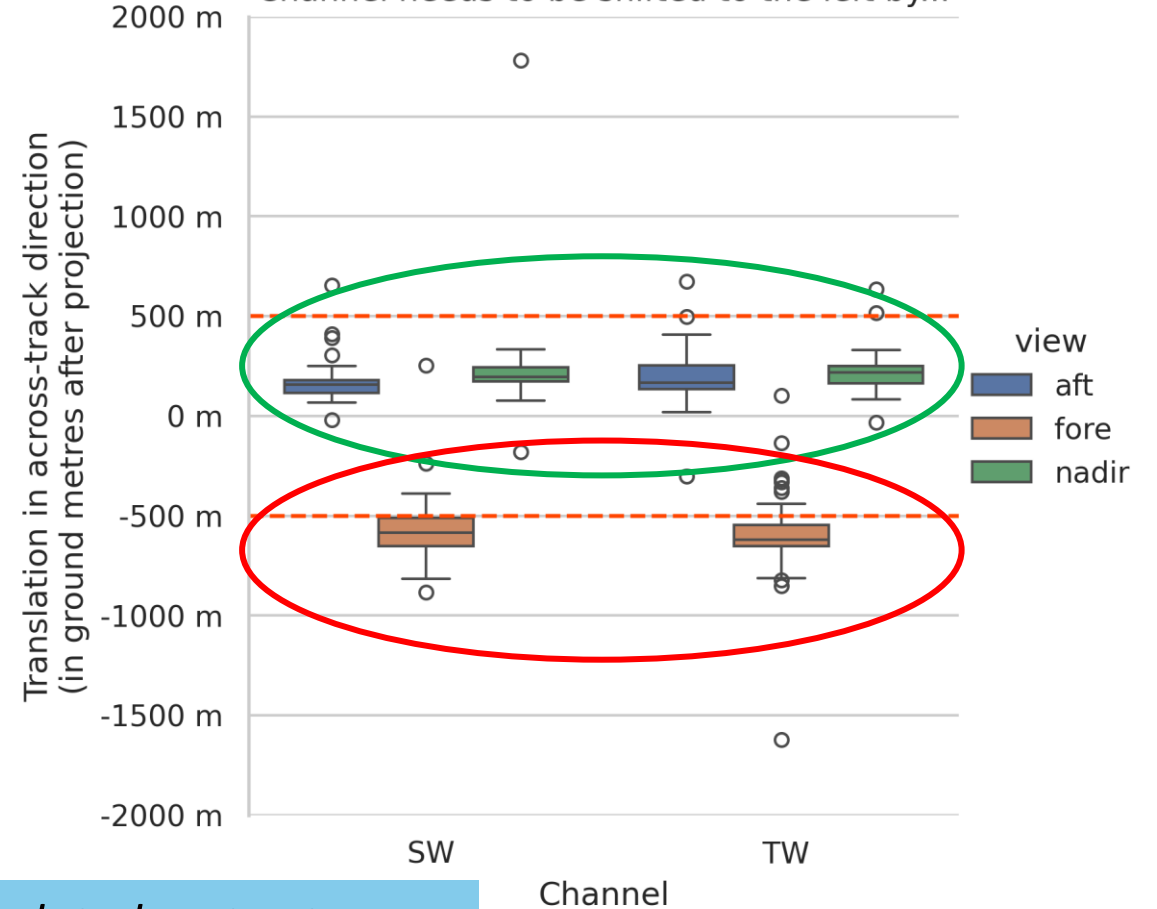


**Caveat!** Results obtained using reduced data set

Translation in along-track direction after optimization (projection = Hotine Oblique Mercator, grid spacing = 500 m)  
Channel needs to be shifted ahead by...



Translation in across-track direction after optimization (projection = Hotine Oblique Mercator, grid spacing = 500 m)  
Channel needs to be shifted to the left by...



*pointing information updated; not yet available as new baseline*

- Along-track geolocation accuracy:
  - generally good, except in specific areas (characterization ongoing)
- Across-track geolocation accuracy:
  - slightly out-of-spec, expected to be fixed in baseline update for *nadir* and *aft* views
- Characterization ongoing; interpret product geolocation with care!
  - ⇒ *also holds for B-NOM, which is an integration of B-SNG, and BM-RAD and BMA-FLX*