SWOT WSE from different tracks and geoid issue for Tanganyika lake (Africa)
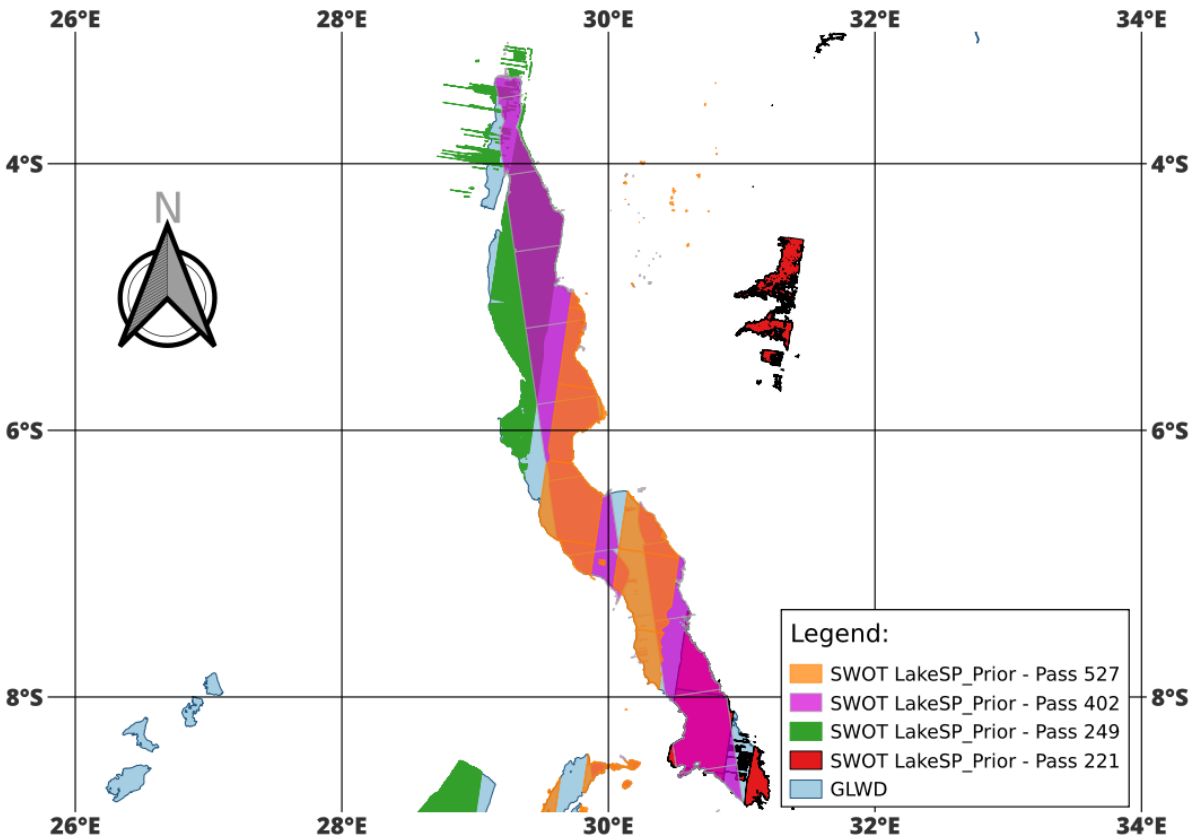
S. Biancamaria and J.-F. Crétaux
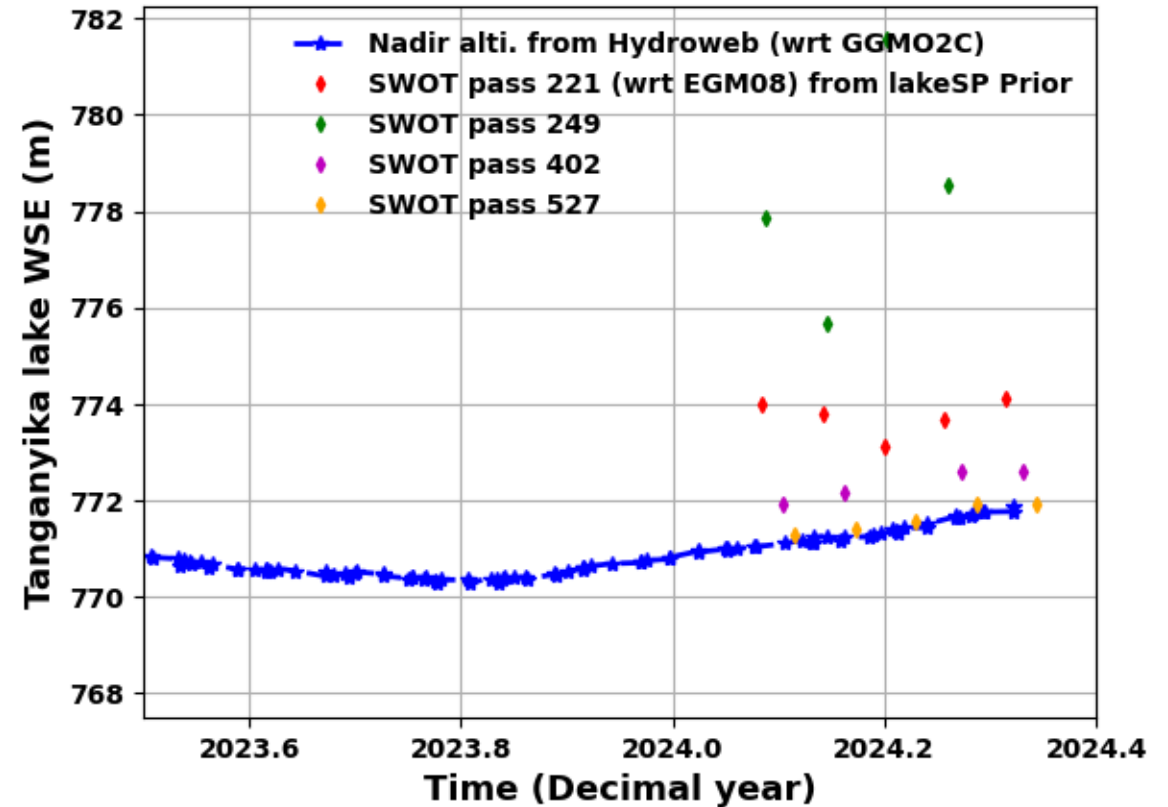
- Tanganyika lake area ~32,800 km2

- Longest and second deepest lake in the world, it contains 17% of open surface fresh water on Earth surface

SWOT L2 HR LakeSP Prior vector product compared to nadir altimetry
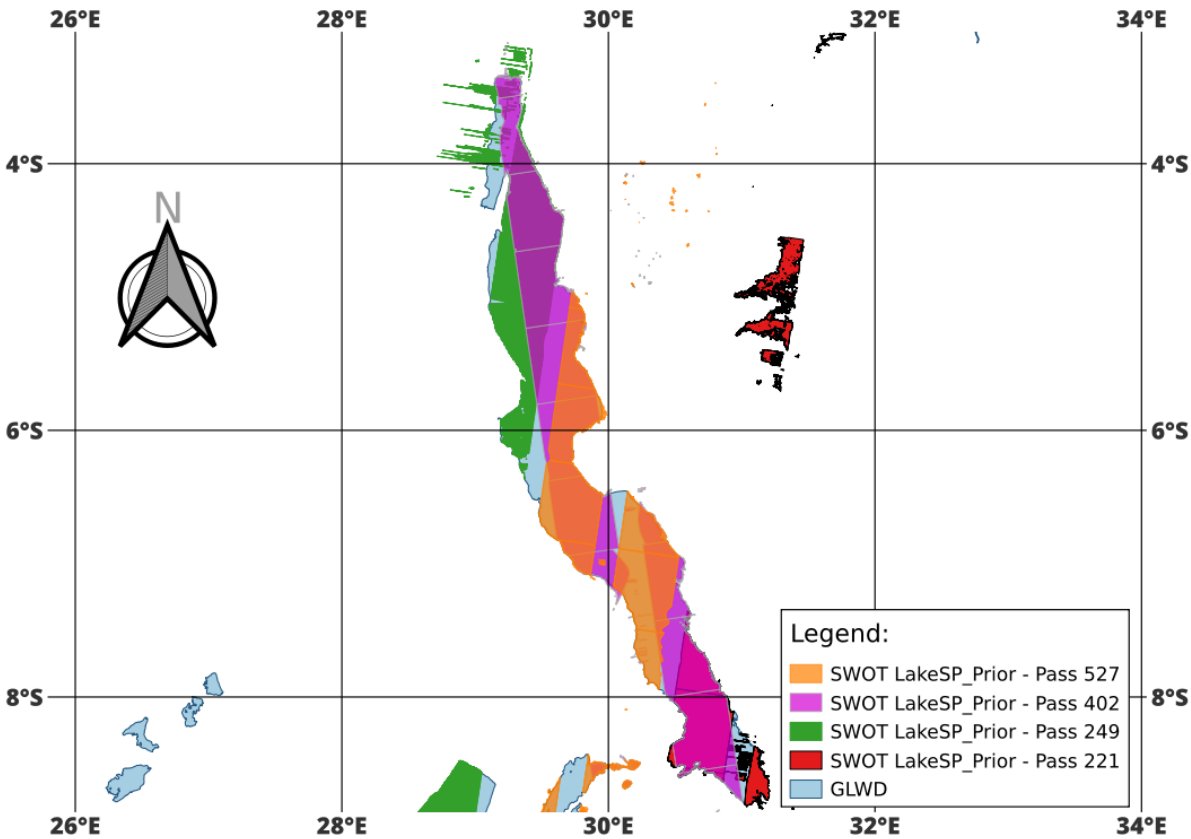
SWOT Passes on Tanganyika lake

Legend:
- SWOT LakeSP_Prior - Pass 527
- SWOT LakeSP_Prior - Pass 402
- SWOT LakeSP_Prior - Pass 249
- SWOT LakeSP_Prior - Pass 221
- GLWD

LakeSP Prior PIC0

Legend:
- Nadir alti. from Hydroweb (wrt GGMO2C)
- SWOT pass 221 (wrt EGM08) from lakeSP Prior
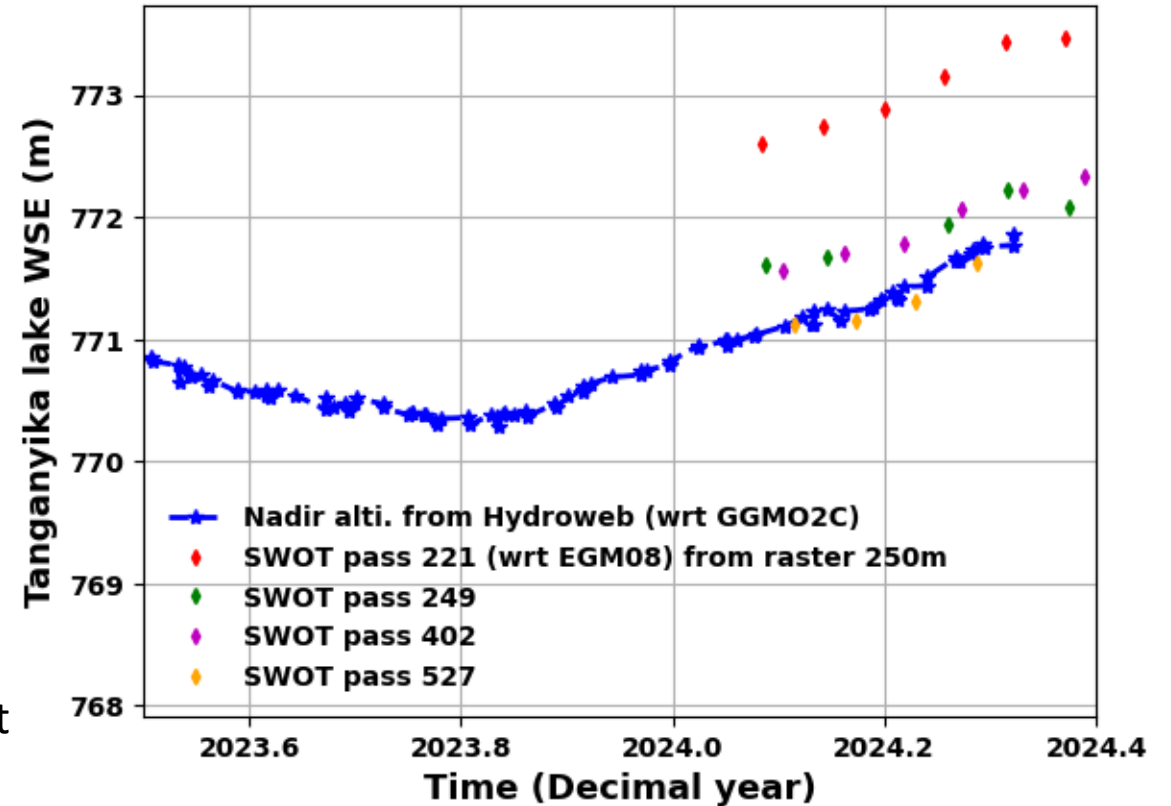- SWOT pass 249
- SWOT pass 402
- SWOT pass 527

- WSE from nadir altimetry quite different from SWOT WSE

- Seems to have some issue with one swath for pass 249

- Biases between WSE from different SWOT passes -> due to the coarse geoid

SWOT L2 HR 250m Raster product compared to nadir altimetry

SWOT Passes on Tanganyika lake

Legend:
- SWOT LakeSP_Prior - Pass 527
- SWOT LakeSP_Prior - Pass 402
- SWOT LakeSP_Prior - Pass 249
- SWOT LakeSP_Prior - Pass 221
- GLWD

Raster 250m - WSE qual=0

- Nadir alti. from Hydroweb (wrt GGMO2C)
- SWOT pass 221 (wrt EGM08) from raster 250m
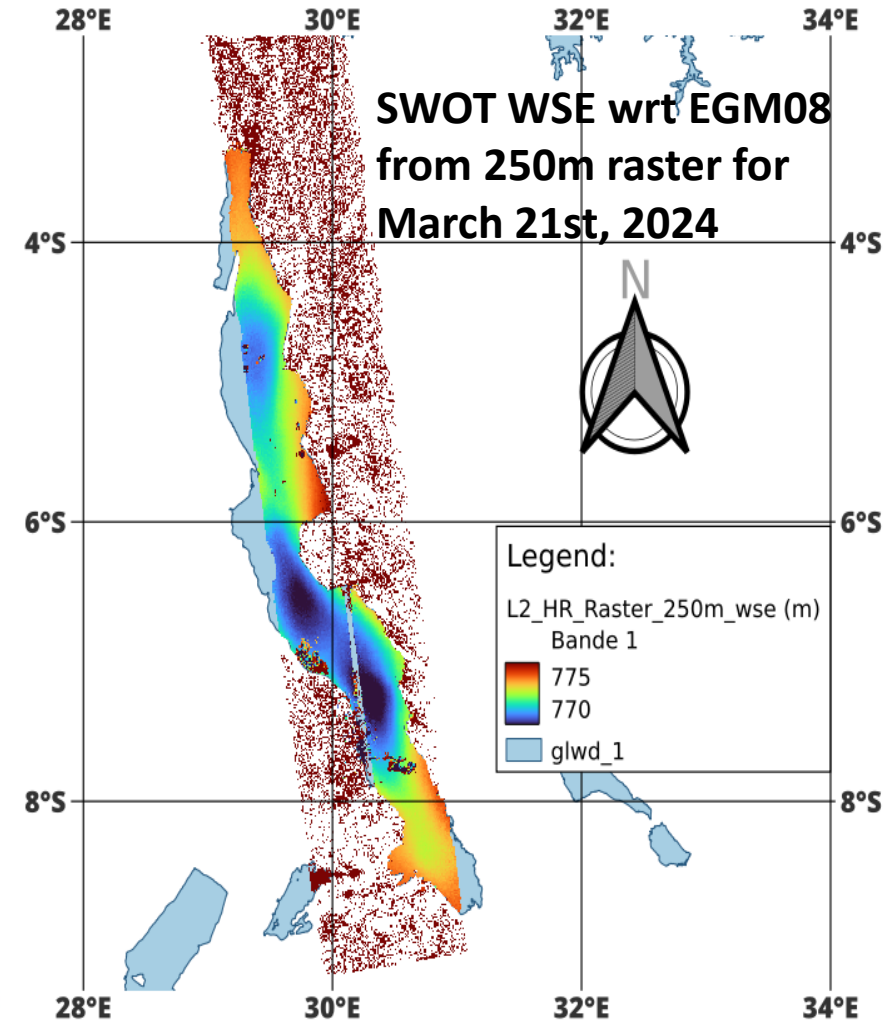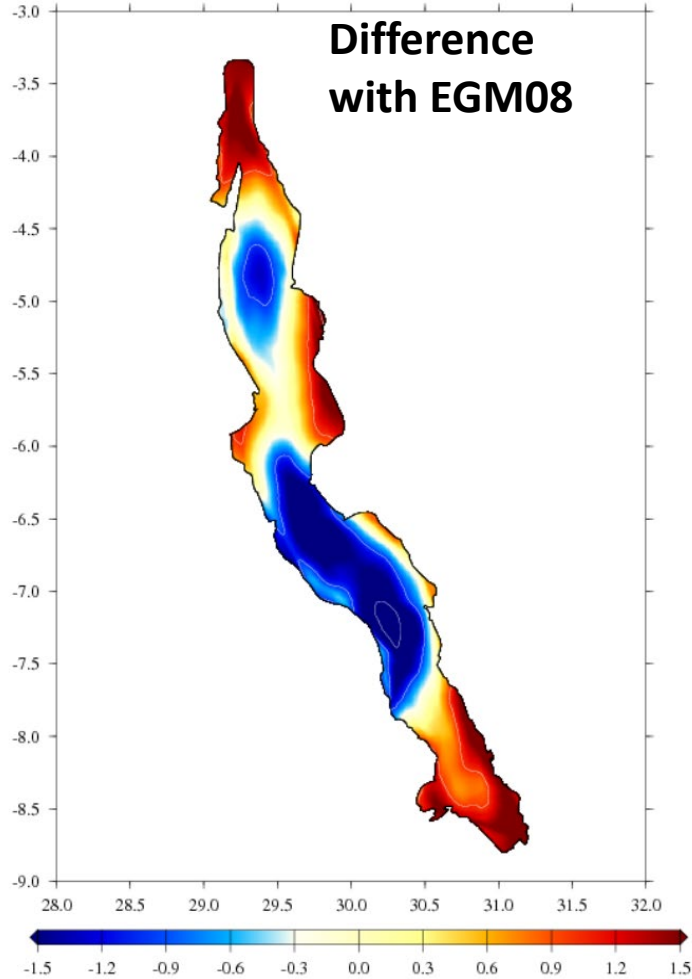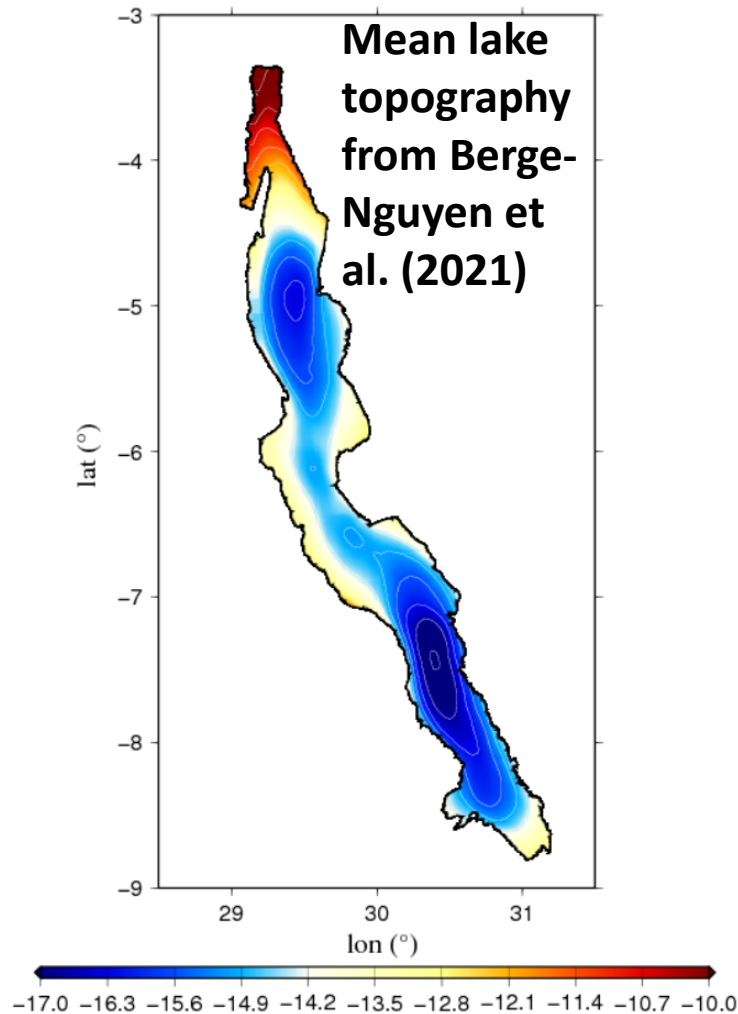- SWOT pass 249
- SWOT pass 402
- SWOT pass 527

- Only pixels with WSE quality indicator = 0 (i.e. "good") are kept

- No more issue with swath for pass 249

- Biases between WSE from different SWOT passes -> due to the coarse geoid
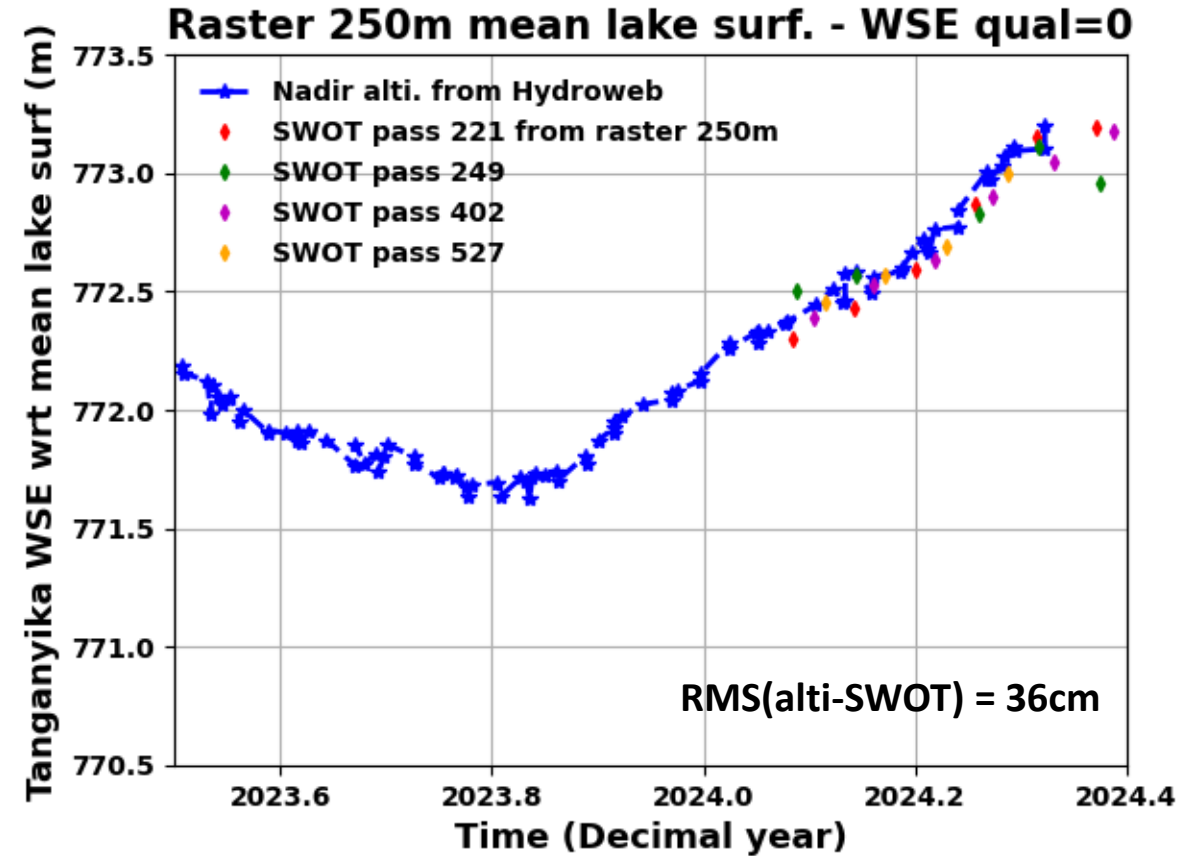
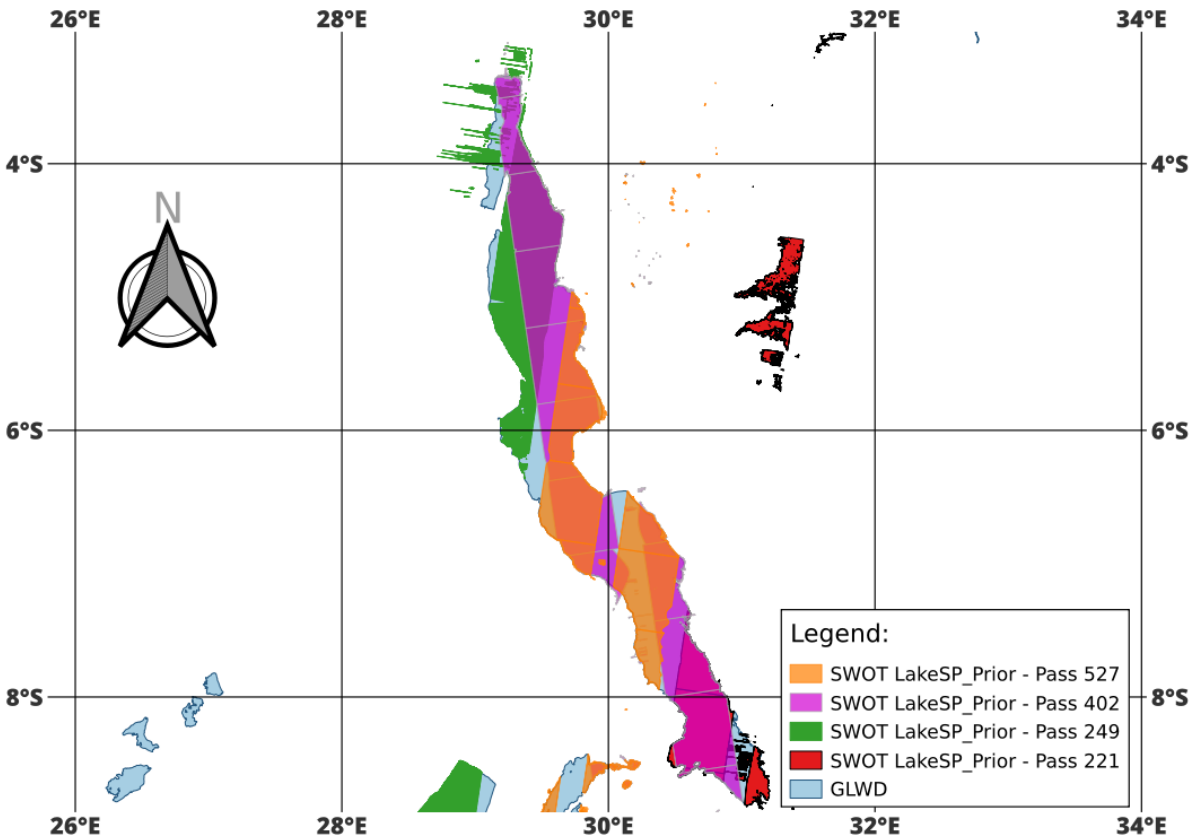# Geoid issue and mean lake surface topography

- For big lakes like Tanganyika, L2 HR product are not adapted (EGM2008 is too coarse)

- Specific processing needed (i.e. selecting an appropriate precise geoid corresponding to the mean lake topography):

Mean lake topography from Berge-Nguyen et al. (2021)

Difference with EGM08

SWOT WSE wrt EGM08 from 250m raster for March 21st, 2024

SWOT L2 HR 250m Raster referenced to mean lake topography

SWOT Passes on Tanganyika lake

Legend:
- SWOT LakeSP_Prior - Pass 527
- SWOT LakeSP_Prior - Pass 402
- SWOT LakeSP_Prior - Pass 249
- SWOT LakeSP_Prior - Pass 221
- GLWD

Raster 250m mean lake surf. - WSE qual=0

- Nadir alti. from Hydroweb
- SWOT pass 221 from raster 250m
- SWOT pass 249
- SWOT pass 402
- SWOT pass 527

RMS(alti-SWOT) = 36cm

- SWOT time series wrt appropriate reference is much better, as expected

- Biases between alti and SWOT is only due to the different vertical reference used