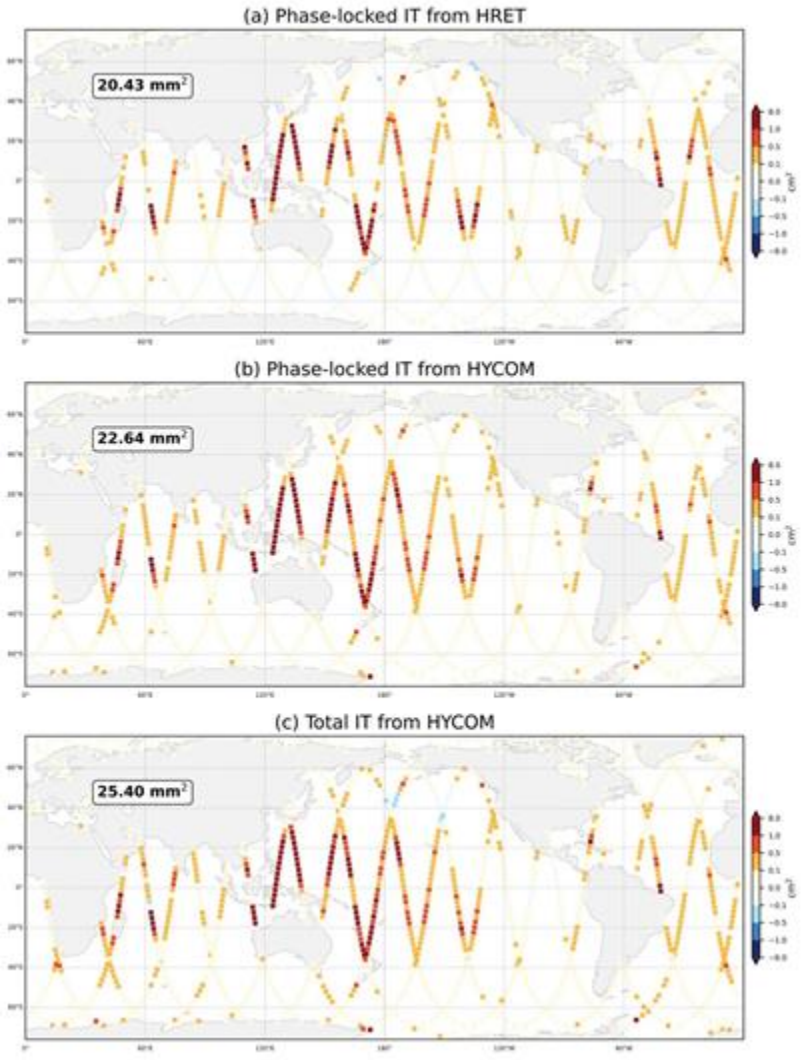
Mapping Internal Tides with SWOT and HYCOM

Badarvada Yadidya and Brian K. Arbic, University of Michigan
Jay F. Shriver, Naval Research Laboratory
Edward D. Zaron, Oregon State University
Maarten Buijsman, University of Southern Mississippi
Eric P. Chassignet, Florida State University
Loren Carrère and Michel Tchilibou, CLS, France

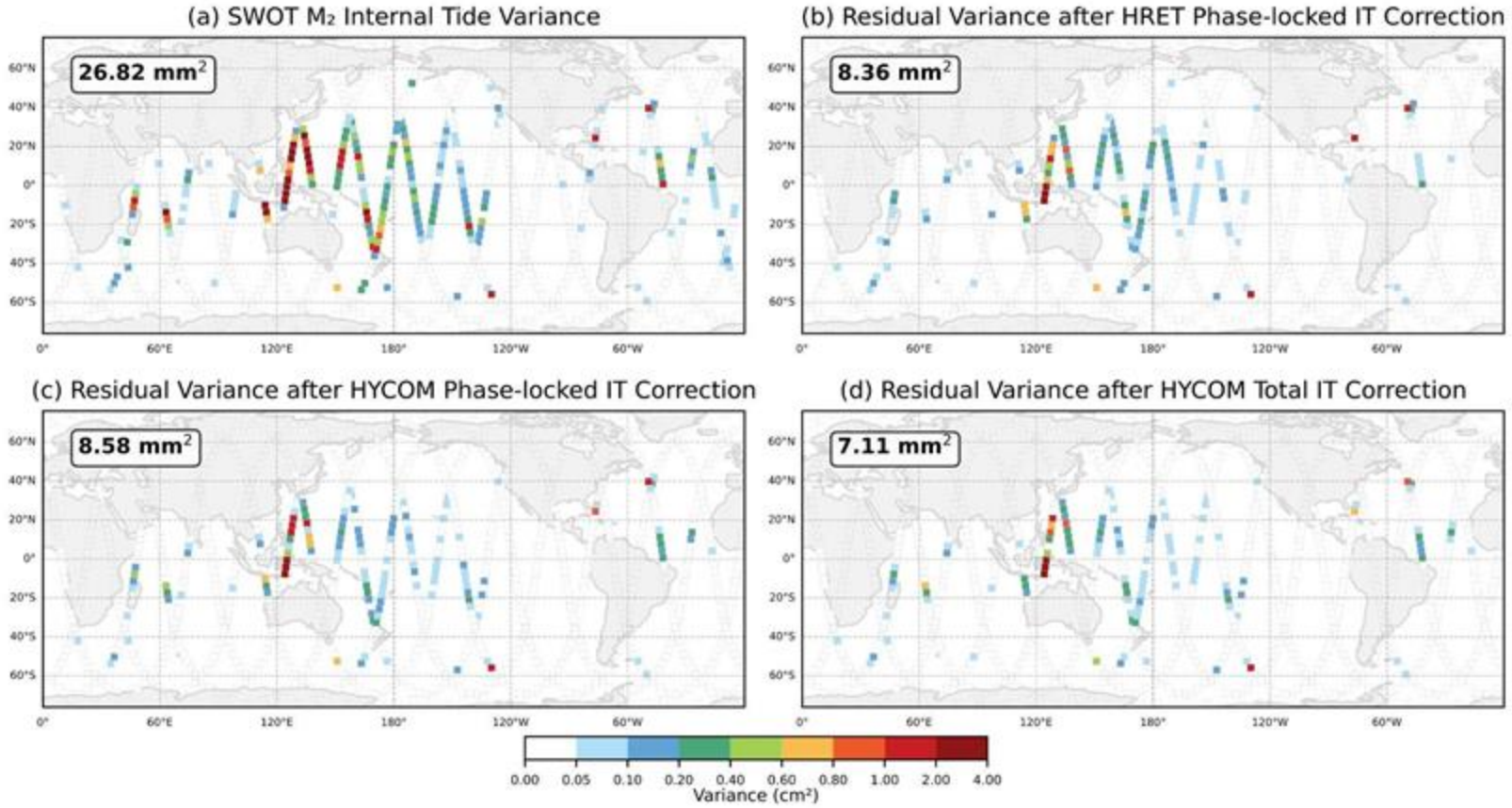
SWOT ST Meeting, 2025
Arcachon, France

SWOT Cal/Val

HYCOM can remove up to 24% more internal tide variance than HRET during SWOT Cal/Val

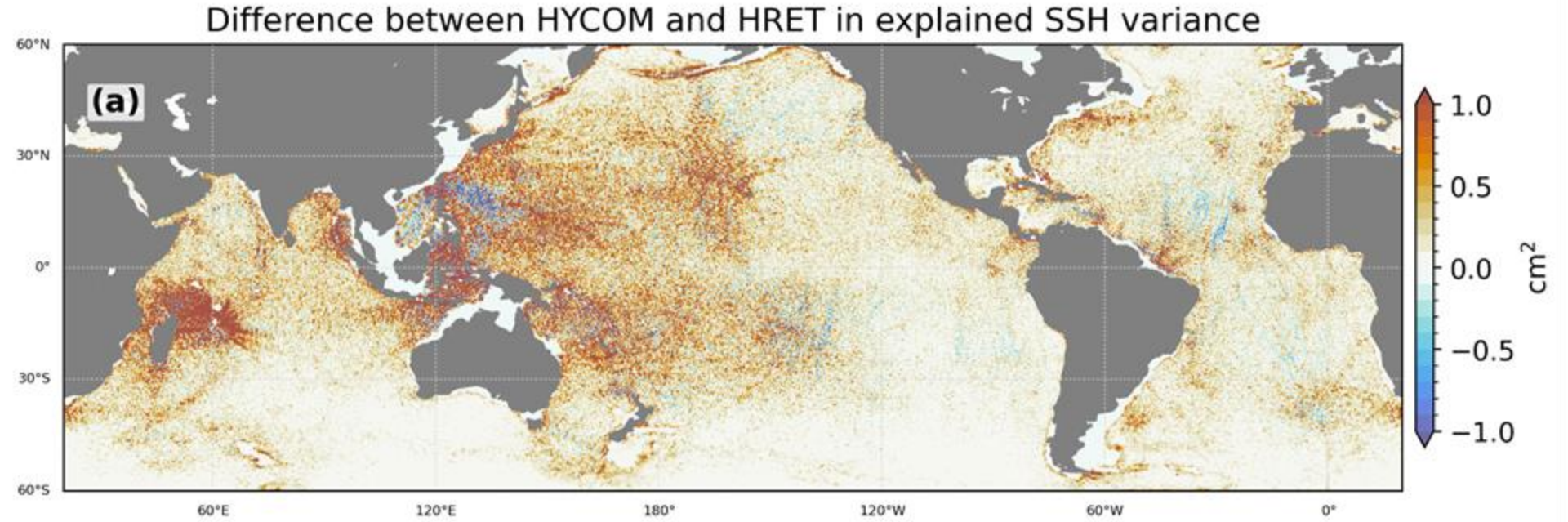


HYCOM removes 74% of total M_2 internal tide

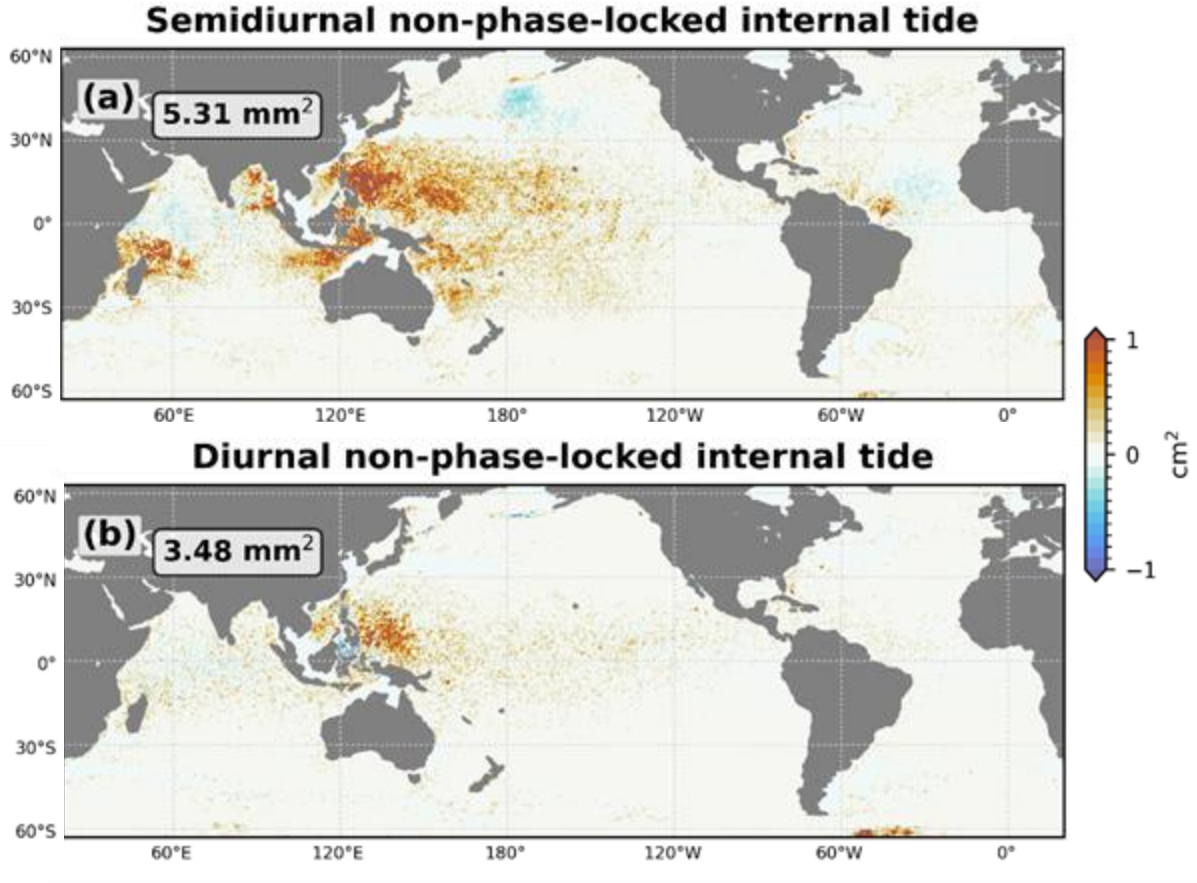


SWOT SCIENCE orbit (21-day)

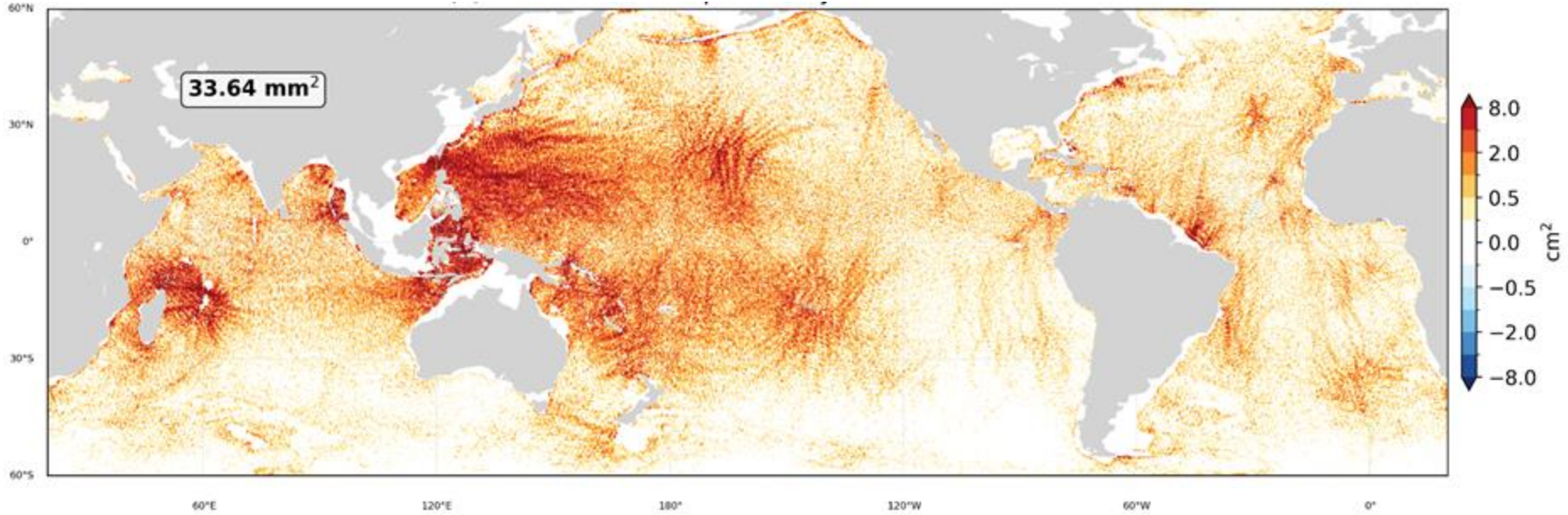
HYCOM does 20% better than HRET in a one-on-one comparison



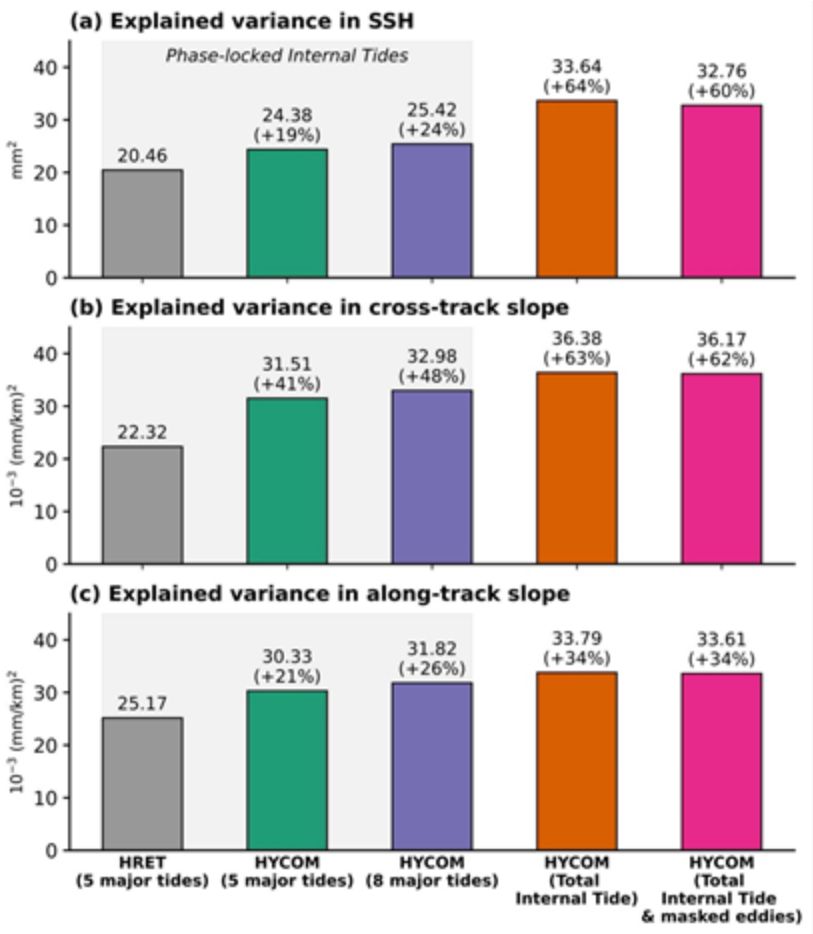
Non-phase-locked internal tide in SWOT as explained by HYCOM



Variance of the total internal tide signal explained by HYCOM



HYCOM removes over 60% more internal tide SSH & cross-track slope variance than HRET



Conclusions

- **Cal/Val Phase:** HYCOM **outperforms HRET by 24%** for internal tide SSH.
- **SCIENCE Orbit:** The performance advantage **jumps to 60%** for both SSH and Sea Surface Slope.
- **Ongoing Work:** Fixes for known issues (thermobaric instability, bathymetry) are **currently in progress**.
- **Next Steps:** We're collaborating with French partners to **integrate these results into future SWOT data products**