

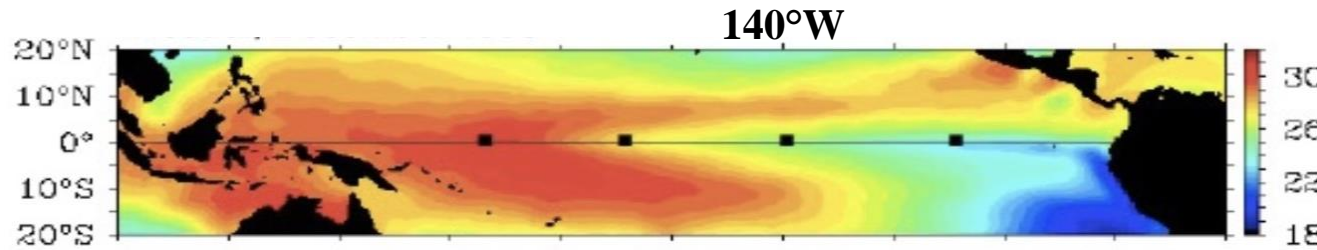
ECCO Equatorial Currents

David Halpern

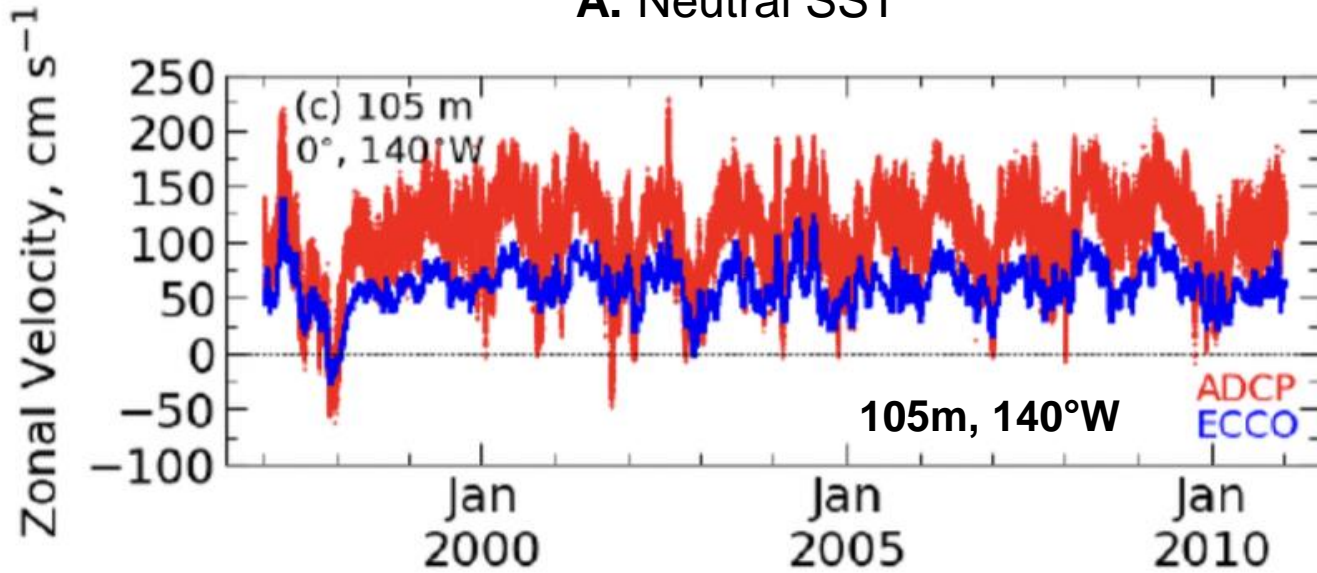
Scripps Institution of Oceanography

- Comparison of ADCP and ECCOv4r4 Currents in the Pacific Equatorial Undercurrent

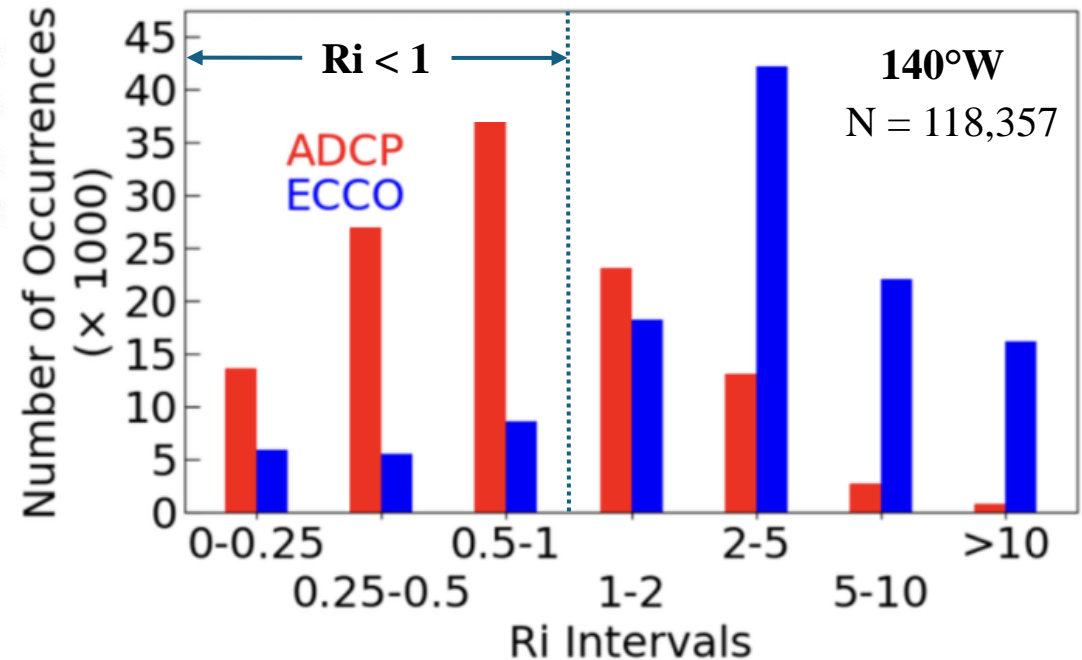
- ❖ David Halpern, Megan K. Le, Timothy A. Smith, and Patrick Heimbach (2023) *Journal of Atmospheric and Oceanic Technology*, 40, 1369-1381.



A. Neutral SST



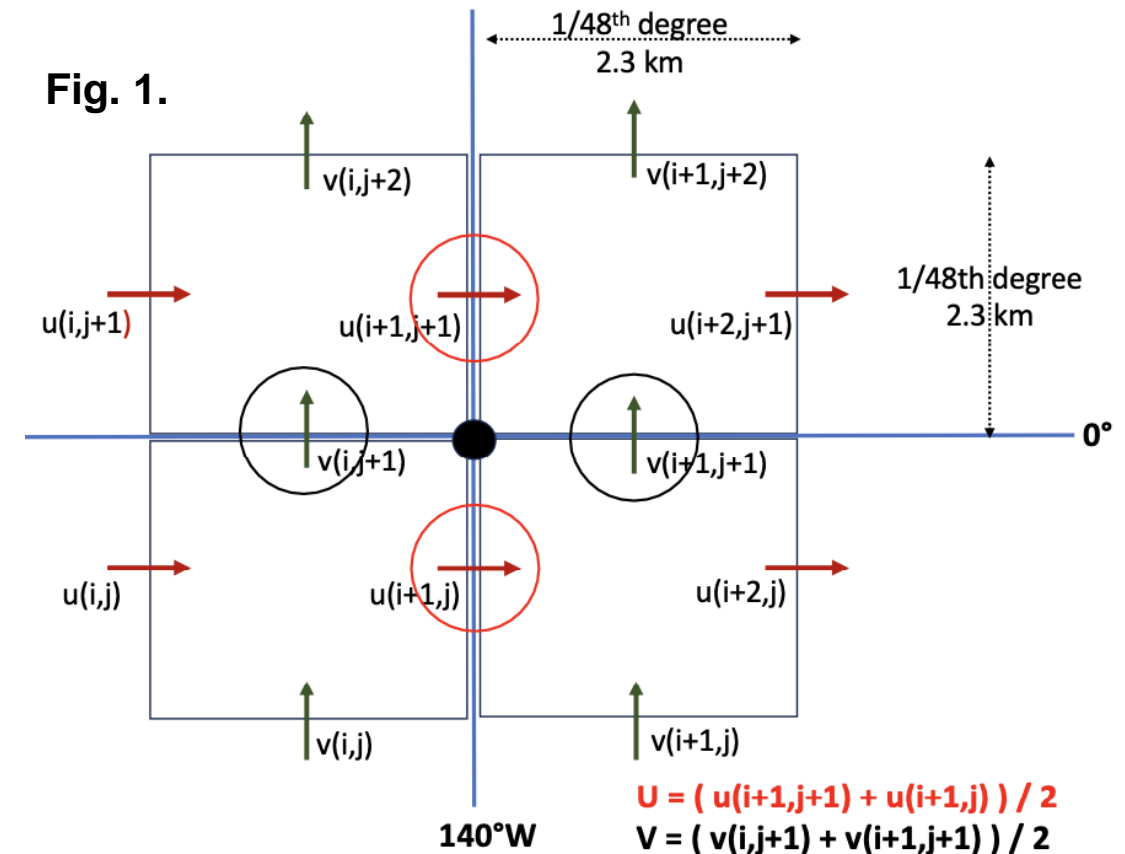
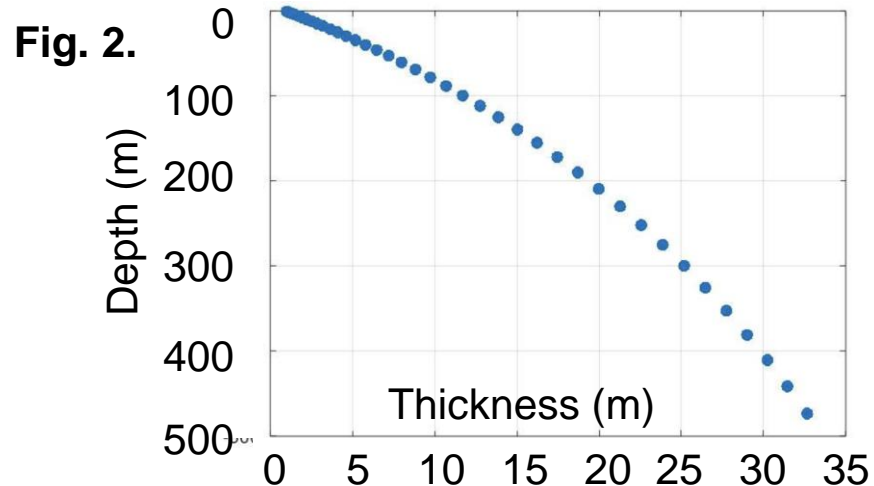
B. EUC core speed at 105m depth and 0°, 140°W.



C. Histogram of ECCOv4r4 (blue) and ADCP (red) 1-h-averaged Ri between the depth of the core speed and the upper depth where the zonal current was 20 cm s⁻¹.

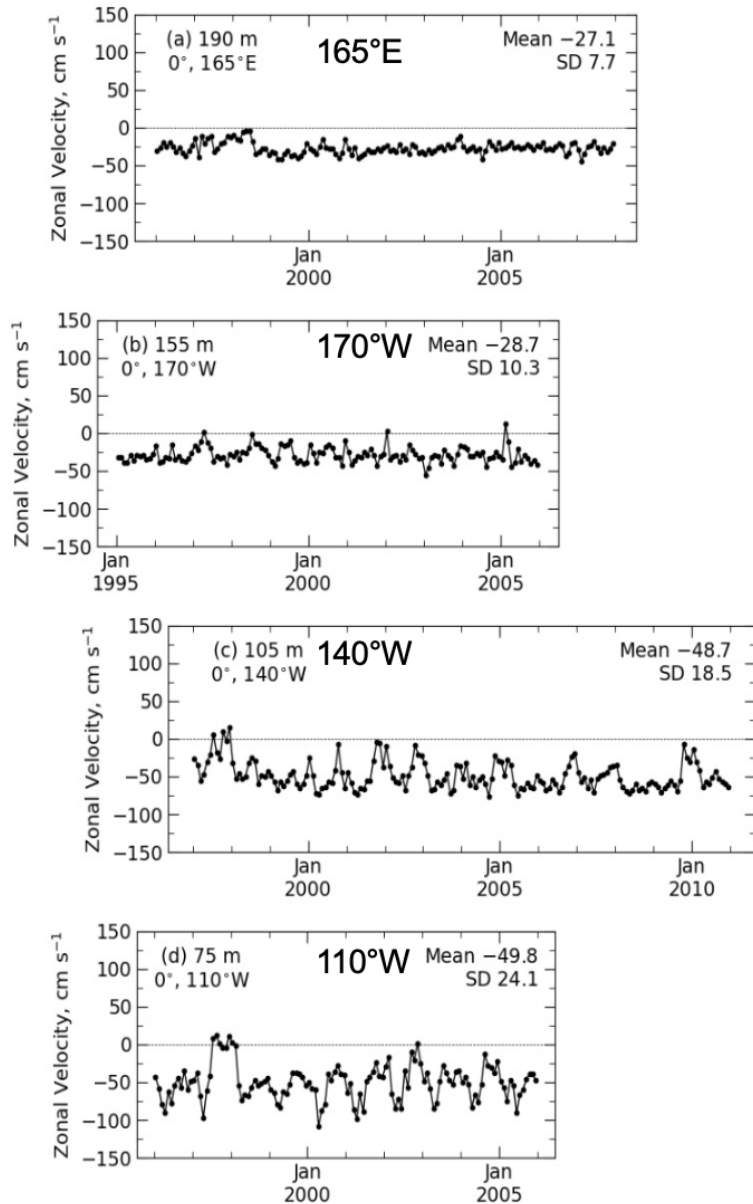
Impact of ECCO North-South Grid Size on EUC Velocity

- [Slide 1] ECCOv4r4 Central Production (CP) EUC core speed was considerably smaller than ADCP.
- ECCOv4r4 CP meridional grid size was 0.4° or 44km compared to a point measurement at 0° .
- ECCO v5, expected for release in 2024, will have a nominal $1/3$ -degree grid spacing at the equator.
 - Verdy et al. (2017) demonstrated that a 33-km spacing of the north–south grid of an ECCO-like model-data system was too large to capture the intensity of the EUC.
- Dimitris Menemenlis, Kate Zhang, and I are examining the impact of N-S grid dimension with a comparative study of equatorial currents produced by Dimitris' ECCO-like model-data system LLC4320 and measured with ADCPs.

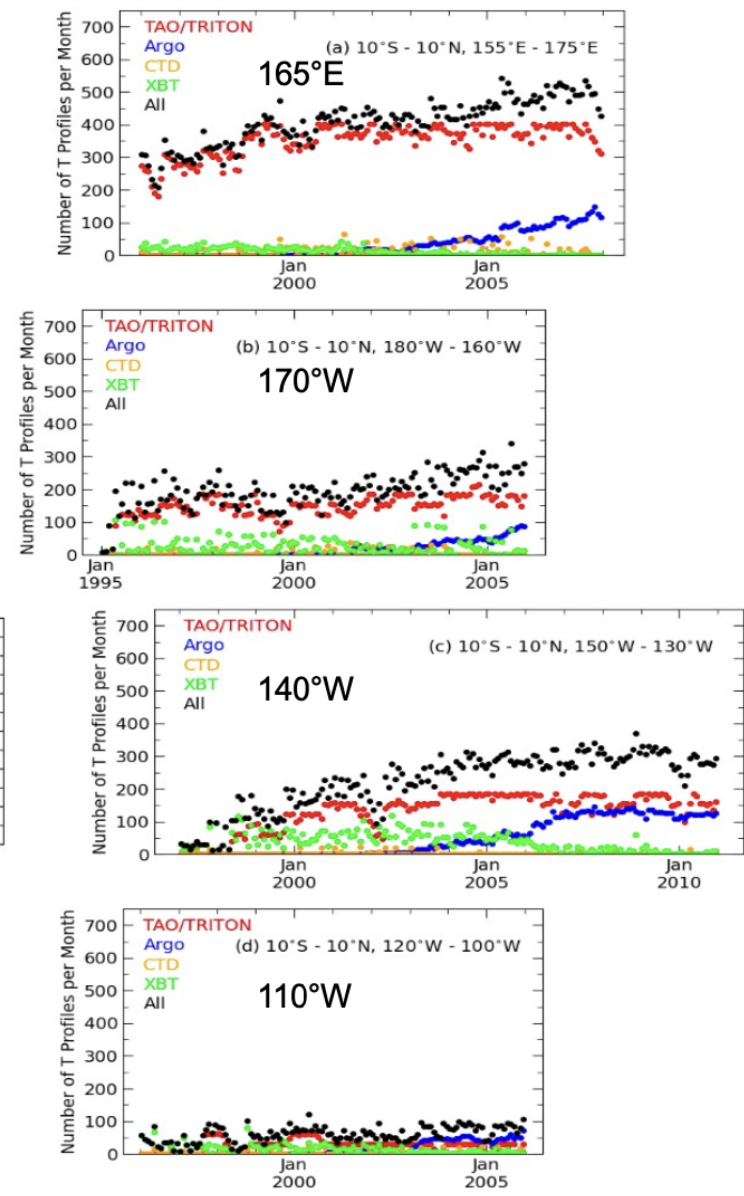


Impact of Assimilation of In-situ (and Satellite) Data on ECCO EUC

ECCOv4r4 - ADCP Δu



Monthly number (N) of Argo, CTD, XBT, and TAO/TRITON profiles assimilated in ECCOv4r4 in 20°x20° regions centered on ADCP mooring



assimilated in ECCOv4r4 in 20°x20° regions centered on ADCP mooring

Hypothesis: Representativeness of ECCOv4r4 currents is related to quantity of assimilated in-situ T & S data

- Valid
 - 165°E: high N & low Δu
 - 110°W: low N & high Δu
- Invalid
 - 165°E: N increases but Δu remains uniform
 - 110°W: large fluctuations in Δu were independent of uniform N
 - 110°W & 8-mo interval in 1997: low N & $\Delta u = 0$
- Weak hypothesis
- Similar result with salinity