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Oral
An “eddying” global ocean general circulation model with high horizontal and vertical resolution and astronomical tidal forcing in addition to atmospheric forcing is used to examine the errors in the vertical mode decomposition of oceanic flows estimated from historical current meters with relatively sparse vertical resolution. The model barotropic and internal M2 tides agree well in amplitude with the tides estimated from aliased altimetric sea surface heights as shown in Shriver et al. (2012). The model barotropic M2 tidal velocity agrees reasonably well with other barotropic tidal models. However, barotropic tidal velocities are not directly measured in the ocean, but are estimated from moored current meters. The vertical distribution of meters on the moorings are not optimal for estimating the barotropic velocity and prior estimates have made substantial approximations to get estimates. In the numerical model, the sampling of velocity in the vertical is much greater allowing for error estimates in the barotropic velocity to be obtained. For the model, coarse sampling at the observation depths leads to ~11% underestimate in the amplitude of both the major and minor axes of the M2 barotropic tidal ellipse. The model overestimates the M2 barotropic tidal ellipse axes by ~20% compared to the data-assimilative TPXO 7.2 barotropic tide. The spatial correlation between the model and both the sampled and TPXO M2 barotropic tide is high. The ellipse axes estimated from the current meter moorings are much weaker than the model, typically ~60%, with a much lower spatial correlation. For the first baroclinic mode, the sampling leads to an overestimate of the model ellipse axes, but the current meter ellipse axes are still weaker than the model. The presence of higher vertical modes in the observations, which are missing from the model in deep water, appears to the cause for the difference.
OSTS session
Quantifying Errors and Uncertainties in Altimetry Data