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Poster
Internal tides are thought to supply a large fraction of the power needed to keep the abyssal oceans stratified. However, because they often propagate 1000's of kilometers from their sources, determining the spatial distribution of their dissipation is a challenge. Toward this goal, we use multiple altimetric satellites and a global eddy-resolving model with tides to examine the attenuation of the mode-1 M2 internal tide from three major sources in the North Pacific: the Aleutians, the Hawaiian Ridge and the Mendocino Escarpment. The model is first used to compute the coherent fraction of the signals, which decreases with range owing to refraction by time-varying mesoscale eddies. The observed altimetric fluxes are then corrected for this coherent loss, since altimeters can only detect the coherent portion and therefore cannot distinguish reduction due to loss of coherence from true dissipation and scattering to higher modes. Signals remain 85\% coherent at 2500 km range north of Hawaii, where eddies are weak, compared to only 50\% coherent where eddies significantly refract the internal tide. The corrected fluxes are then integrated in wedges extending outward from the sources to account for radial spreading. No reduction in flux is detected over 2000 km for sources north of the critical latitude for parametric subharmonic instability (PSI), and over smooth bathymetry. Those south of the critical latitude and/or over rough bottoms experience much stronger attenuation, with reductions of about a factor of two over 2000 km. computed in this manner decays appears strongly dependent on rough bathymetry and parametric subharmonic instability. The results suggest that both PSI and rough topography can remove energy from the internal tide, but in their absence the internal tide can propagate nearly loss-free across entire basins.
OSTS session
Science Results from Satellite Altimetry