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## A DECADE OF ACOUSTIC THERMOMETRY IN THE NORTH PACIFIC (A): USING LONG-RANGE TRAVEL TIMES TO TEST GYRE-SCALE TEMPERATURE VARIABILITY DERIVED FROM OCEAN MODELS

Large-scale temperatures in the North Pacific were measured by long-range acoustic transmissions from 1996–2006. Acoustic travel-time data are inherently integrating, suppressing mesoscale variability and providing accurate measures of large-scale temperature variability with high temporal resolution, subject to the limitations of the ray path sampling. Even at gyre scales, the ocean is found to be highly variable, with significant changes occurring on time scales as short as a few weeks. The interannual variability is large compared to trends in the data. Travel times equivalent to the measured travel times have been calculated using objectively-mapped 0–750 m temperature fields for the global ocean derived from satellite altimetry and profile data. Similar comparisons have also been made using travel times derived from the "Estimating the Circulation and Climate of the Ocean" (ECCO) model, constrained by satellite altimetry and profile data using data assimilation methods. In both cases the measured and calculated travel times are similar, but they also show significant differences. These results suggest that the acoustic travel times can be used to provide meaningful additional constraints on model behavior.

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