

## Combining ocean observations and circulation models

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Ocean reanalyses combine ocean models with observations to provide a state estimation. The resulting reanalyses can be used to study climate variability and as initial conditions for fine resolution regional models. There have been many recent advances in both global observing programs and in ocean modeling that have led to more accurate state estimations that cover the last 50 years. This talk will review the state of ocean reanalyses. The topics that will be covered include the various approaches to ocean data assimilation including optimum interpolation, the Kalman filter, and the adjoint method, and a discussion of their relative strengths and weaknesses. A comparison of several existing reanalyses will be discussed, with an emphasis on both well-understood climate phenomena, such as El Nino, and less well-understood climate phenomena, such as decadal variability. Last, we will explore the future of data assimilation, with the goal of understanding how reanalyses might improve.