# An Ensemble of Ocean Reanalyses for Climate Studies

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An 18 member ensemble of ocean reanalyses spanning the period from 1871 through 2010 is conducted using the SODA methodology. The ensemble reanalyses use forcing the ensemble members of the 20th Century reanalysis project. Ocean sea surface temperature data from ICOADS 2.5 is assimilated, but with a bias correction as implemented for HadISST (the bucket correction).

The reanalysis is used to explore climate variability in the tropical Pacific Ocean. The results show that there is a broad range of variability in all of the characteristics. The reanalysis shows that the location of ENSO is normally distributed about a single mean value, suggesting that there are not different types of ENSO based on location. The distributions of strength and duration are not obviously normal, so that it is possible that there are different types based on these characteristics. All of the ENSO characteristics have some manifestation of decadal variability, however none of the characteristics have a trend that can shown to be significantly different than zero. However, given the large variance of ENSO characteristics, even 150 years does not contain enough ENSO Events to accurately determine if ENSO has changed. The reanalysis results are largely supported by both the SST reconstructions and CMIP5 historical runs. After the 1950s the ENSO in the reconstructions is similar to ENSO in the reanalysis. Before The 1950s, the timing of ENSO Events is similar between the various products, but the amplitude of events can be different. The CMIP5 models show a wide range of characteristics, with ENSO events that range from too far in the west to too far in the east, and from some models showing very weak ENSO While some models have quite realistic strength. None of the models appear to have different types of ENSO, in agreement with the reanalysis and the reconstructions.