

# Long Term Trends of Tropical Pacific Sea Surface Temperature in SODA 1871-2008

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Long term trends of Sea Surface Temperature (SST) in the tropical Pacific Ocean is of considerable interest due to its essential role in global climate change. Reasons for changing SST may arise from global warming or from changing ocean dynamics. For example, variability of the Subtropical Cell (STC) affects tropical SST through tropical upwelling, so that global ocean data with vertical structure is requisite for exploring the mechanisms that control SST. However, most previous studies of tropical SST trends rely on just the surface ocean, which is insufficient to analyze the processes that cause the trends. In this study we rely on a new version of Simple Ocean Data Assimilation (SODA) that spans the period from 1871 through 2008 to investigate long term trends of tropical Pacific SST, and possible mechanisms responsible for its variability. The ocean component of SODA is based on the Parallel Ocean Program (POP) software, and the resolution is  $0.4^\circ$  (longitude)  $\times 0.25^\circ$  (latitude)  $\times 40$ -level (vertical) with 10 spacing near the surface. The surface forcing of the ocean model is provided from the atmospheric dataset 20CRv2. The results show that significant cooling trends exhibit over the central-eastern tropical Pacific, with slight warming trends in the northeast and southeast tropics. At the same time, total convergence transport of the STC between  $9^\circ N$  and  $9^\circ S$  displays an increasing linear trend with  $8.87\text{Sv}/\text{century}$ , of which 70% of the total transport is contributed from the Southern Hemisphere. The strengthening of the the STC brings cold water from the subsurface via tropical upwelling, cooling the surface temperature,

which results in the cooling trend in the tropics.