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Contributions of surface heat fluxes and oceanic processes to tropical SST changes: Seasonal and regional dependence

Zhuoqi He (1), Renguang Wu (2), Weiqiang Wang (1), Zhiping Wen (3), and Dongxiao Wang (1)

(1) State Key Laboratory of Tropical Oceanography, South China Sea Institute of Oceanology, Chinese Academy of Sciences, Guangzhou, China (zhuoqi@scsio.ac.cn), (2) Center for Monsoon System Research, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China , (3) Center for Monsoon and Environment Research /School of Atmospheric Sciences, Sun Yat-sen University, Guangzhou, China

We employ six surface heat flux datasets and three ocean assimilation products to assess the relative contributions of surface heat fluxes and oceanic processes to the sea surface temperature (SST) change in the tropical oceans. Large differences are identified in the major terms of the heat budget equation. The largest discrepancies among different datasets appear in the contribution of vertical advection. The heat budget is nearly balanced in the shortwave radiation and horizontal advection-dominant cases, but not balanced in some of the latent heat flux and vertical advection-dominant cases. The contributions of surface heat fluxes and ocean advections to the SST tendency display remarkable seasonal and regional dependence. The contribution of surface heat fluxes covers a large geographical area. The oceanic processes dominate the SST tendency in the near-equatorial regions with large values but small spatial scales. In the Pacific and Atlantic Ocean, the SST tendency is governed by the dynamic and thermodynamic processes respectively, while a wide variety of processes contributes to the SST tendency in the Indian Ocean. Several regions have been selected to illustrate the dominant contributions of individual terms to the SST tendency in different seasons. The seasonality and regionality of the interannual air-sea relationship indicates a physical connection with the mean state.