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Poster
Sea surface temperature is an Essential Climate Variable. The radiative impact of mineral dust is one of the major contributors to inaccuracies in the satellite-retrieved sea surface skin temperature (SSTskin). Different aerosol dust vertical distributions have varying effects on the satellite-derived SSTskin. To further investigate the physical mechanisms of aerosol effects on Terra MODerate-resolution Imaging Spectroradiometers (MODIS) derived SSTskin, the aerosol radiative effects were studied with a field-data match-up analysis and radiative transfer simulations. The field data are measurements of the SSTskin derived from highly accurate ship-based infrared spectrometers vertical atmospheric temperature and water vapor radiosonde profiles. The aerosol dust concentrations in three-dimensions from the NASA Modern-Era Retrospective analysis for Research and Applications, Version 2 have been used as input to radiative transfer simulations. Based on the analysis of field data and simulations, we have empirically determined that the sensitivity of the Terra MODIS retrieved SSTskin accuracies is related to 1) dust concentration in the atmosphere, 2) the dust layer altitude, and 3) the dust layer temperature. As the aerosol altitude increases, the effect on the SSTskin retrievals becomes more negative in proportion to the temperature contrast with the sea surface. SSTskin differences, satellite-derived - surface measurements, for a given aerosol layer optical depth vary between -3 K and 1 K according to our match-up comparisons and radiative transfer simulations.
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