

Tropical clouds and circulation changes during recent El Niños

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Changes in tropical clouds, cloud radiative forcing (CRF) and atmospheric circulation exhibit distinctly different characteristics during the 2009-10 Central-Pacific El Niño and 2006-07 Eastern-Pacific El Niño, based on the analysis of CloudSat/CALIPSO and reanalysis data. The 2009-10 El Niño shows a strengthening of tropical circulation, increased high (low) clouds in extremely strong ascending (descending) regimes and decreased mid-to-high clouds in a broad range of moderate circulation regimes, resulting in a reduction of mid-to-high level deep clouds on the tropical average. The net tropical-mean CRF anomaly at the top-of-the-atmosphere is about 0.6-0.7 W/m² cooling, suggesting a negative cloud feedback for the surface warming. The 2006-07 El Niño shows nearly opposite tropical-mean anomalies of clouds and CRF, highlighting the importance of SST anomaly patterns in determining the cloud response and their radiative forcing.