



Record warming in the South Pacific and western Antarctica associated with the 2009-10 El Nino

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Satellite data for the past three decades reveal a record-high sea surface temperature (SST) anomaly within a large mid-latitude region of the south-central Pacific (SCP) during the mature phase of the 2009-10 El Nino, with a peak magnitude that is 5 times the standard deviation of local SST anomaly and is warmer than the concurrent tropical-Pacific SST anomaly. In-situ observations indicate that the SCP oceanic warming was confined to the mixed layer. Scatterometer and atmospheric reanalysis products reveal that the record warming event was associated with an extremely strong and persistent anticyclone. A heat budget analysis suggests that wind changes associated with the anticyclone were the main causes of the oceanic warming, with surface heat flux and ocean processes playing equally important roles. The anticyclone diverted the relatively warm air carried by the circumpolar westerlies and the relatively warm waters carried by the Antarctic Circumpolar Current towards western Antarctica. Austral-summer SST in the Bellingshausen Sea also reached a three-decade high. The extreme atmospheric and oceanic anomalies in the South Pacific may have been amplified by the 2009-10 El Nino due to the record-high SST anomaly in the central equatorial Pacific. Implications of such extreme events to the Antarctic environment is discussed in light of the increasing intensity of El Nino in the central equatorial Pacific observed for the past three decades as reported by Lee and McPhaden (2010).