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Evidence for the enhancement of atmospheric zonal overturning circulation over the tropical Pacific in the late-1990s

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The recent enhancement of the Walker circulation since the late-1990s has been investigated in this study based on observations. Associated with this enhancement are enhanced precipitation in the tropical western Pacific, enhanced ascent in tropical western Pacific, anomalous westerly in the upper troposphere, descent in central and east tropical Pacific, and anomalous surface easterlies in the tropical Pacific. Seasonality of these changes is relatively small. The characteristics of associated oceanic changes are strengthened thermocline slope and enhanced zonal SST gradient across the tropical Pacific since the late-1990s. Many characteristics of these changes occurred in late late-1990s are similar to what happened associated with the mid-1970s climate shift with an opposite sign. The intensification of the Walker circulation since the late-1990s indicates that one must be cautious about conclusion that the Walker circulation is weakening since the significant decadal fluctuation could temperaily offsets or reverse the long term trend.