

CHANGES IN MSLP OVER QUEENSLAND AND THE SOUTHERN HEMISPHERE

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The rainfall decline across much of coastal and southeast Queensland has placed extreme pressure on water resources and agriculture in this region for over ten years. We have conducted analyses on mean sea level pressure changes from observations over Queensland and compared these to data from NCEP and IPCC-AR4 ~~data~~ for the 20th century. We also present 21st century projections from the IPCC-AR4 models to assess whether the current trends will continue.

The rainfall decline in Queensland which started around 1951 has been accompanied by a steady increase in mean sea level pressure over the same period. The strongest decreases in rainfall are in the summer, autumn and winter seasons. These seasons also show the strongest increases in mean sea level pressure from observations. NCEP data shows similar trends to these observations. The IPCC-AR4 data shows a consistent trend from most models of rising mid-latitude mean sea level pressure and falling high-latitude (South Pole) mean sea level pressure. This “see-saw” of rising mid-latitude and falling high-latitude mean sea level pressure continues unabated using IPCC-AR4 projections into the 21st century.

Our analysis of mean sea level pressure over the Southern Hemisphere indicates the drying trends over coastal and southeast Queensland are likely to continue during the 21st century due to increasing mean sea level pressure in mid-latitudes and decreasing mean sea level pressure at the South Pole. The combination of a weakening Walker and increasing Hadley circulation with an increasing SAM trend are important drivers to changes in mean sea level pressure and rainfall patterns across Queensland and eastern Australia.