



Long-term wind speed trends over Australia

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Accurate estimates of long-term linear trends of wind speed provide a useful indicator for circulation changes in the atmosphere and are invaluable for the planning and financing of sectors such as wind energy. Here a large number of wind observations over Australia and reanalysis products are analyzed in order to compute such trends. After a thorough quality control of the observations, we find that the wind speed trends for 1975-2006 and 1989-2006 over Australia are sensitive to the height of the station: they are largely negative for the 2-m data but are predominantly positive for the 10-m data. The mean relative trend at 2-m is $-0.10 \pm 0.03\%/\text{yr}$ ($-0.36 \pm 0.04\%/\text{yr}$) for the 1975-2006 (1989-2006) period, whereas at 10-m is $0.90 \pm 0.03\%/\text{yr}$ ($0.69 \pm 0.04\%/\text{yr}$) for the 1975-2006 (1989-2006) period. Also, at 10-m light winds tend to increase more rapidly than the mean winds whereas strong winds increase less rapidly than the mean winds; instead at 2-m the trends in both light and strong winds vary in line with the mean winds. We found that a qualitative link could be established between the observed features in the linear trends and some atmospheric circulation indicators (mean sea level pressure, wind speed at 850hPa and geopotential at 850hPa), particularly for the 10-m observations. Further, the magnitude of the trend is also sensitive to the period selected, being closer to zero when a very long period, 1948-2006, is considered. As a consequence, changes in the atmospheric circulation on climatic time scales appear unlikely.