

Response of the Southern Annular Mode to tidal forcing and the bidecadal rainfall cycle over subtropical southern Africa

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Abstract

Synoptic weather data and rainfall records are used to support previous suggestions that the decadal-scale cycle in certain climate records may be attributed to the modulation in tidal forcing related to the 18.6 year lunar nodal cycle. The Southern Annular Mode (SAM) is shown to be sensitive to tidal forcing on a daily time scale. It is subsequently shown that the late-summer SAM can be predicted by consideration of tidal potential. The seasonal response in the SAM is also reflected in sea surface temperatures. Observed behavior of the atmosphere suggests that changing tidal potential over the lower versus higher latitudinal regions plays a role. The atmospheric response as reflected in the changing SAM affects the daily rainfall variation in certain subtropical parts of southern Africa where rainfall correlates positively with the SAM. The daily rainfall response subsequently accumulates in a bidecadal rainfall cycle, known over southern Africa as the Dyer-Tyson cycle.