



Using the WRF Regional Climate Model to Simulate Future Summertime Wind Speed Changes over the Arabian Peninsula

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The normal surface pressure distribution in the Middle East includes high pressure over the eastern Mediterranean Sea and low pressure over the southeastern Arabian Peninsula. The resulting west-east pressure gradient leads to summertime northerly or northwesterly shamal winds across the Arabian Peninsula, which typically result in many days per month with substantial lofted dust, leading to considerable human health and transportation impacts. It would be helpful to understand how the regional pressure gradient may change in the future, as the strength of this gradient exerts predominant control over the strength of the shamal wind. One factor possibly leading to changes in the strength of the pressure gradient is climate variability. We have simulated the regional climate under a present-day scenario (2006-2010) and a mid-century scenario (2056-2060) using the Weather Research and Forecasting (WRF) model. Our results indicate a weakening of the regional pressure gradient by mid-century, resulting in lower average wind speeds and fewer days conducive to dust storms across the Arabian Peninsula.