



Secular decrease of wind power potential in India associated with warming in the Indian Ocean

Meng Gao

Harvard University, Cambridge, United States (mgao2@seas.harvard.edu)

The Indian government has set an ambitious target for future renewable power generation, including 60 GW of cumulative wind power capacity by 2022. However, the benefits of these substantial investments are vulnerable to the changing climate. On the basis of hourly wind data from an assimilated meteorology reanalysis dataset covering the 1980–2016 period, we show that wind power potential may have declined secularly over this interval, particularly in western India. Surface temperature data confirm that significant warming occurred in the Indian Ocean over the study period, leading to modulation of high pressure over the ocean. A multivariable linear regression model incorporating the pressure gradient between the Indian Ocean and the Indian subcontinent can account for the interannual variability of wind power. A series of numerical sensitivity experiments confirm that warming in the Indian Ocean contributes to subsidence and dampening of upward motion over the Indian continent, resulting potentially in weakening of the monsoonal circulation and wind speeds over India.