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## Wind turbine operation influences near surface air temperature and humidity

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Surface meteorology regulates ecosystem processes, with implications for the supply of important ecosystem services. Wind farms have been shown to alter the local climate, but there have been limited field measurements of the variability of impact in different directions relative to the wind farm. In addition, the influence of land coverage variability on atmosphere temperature and humidity has not been eliminated, which will lead to the impact of wind turbines on atmosphere temperature and humidity may be over topped or underestimated. Here, we show the impact of Huitengliang wind power base, China, on air temperature and humidity using data from five automatic meteorological monitoring stations. After eliminating the influences of land surface coverage as much as possible, by comparing the variability of temperature and humidity inside the wind farm, and in the upwind, downwind and side wind directions, daily and seasonal variations in temperature and humidity were obtained. We found that wind turbines increase the temperature and decrease the humidity of the surface atmosphere, the influences are more obvious than the existing results. Particularly, these effects are most obvious in the upwind and downwind directions. The annual average temperature rise was 0.97 °C in the upwind direction and 1.25 °C in the downwind direction. On average throughout the year, humidity decreased by 3.71 % in the upwind direction and 5.66 % in the downwind direction. The magnitudes of these effects are sufficient to alter ecosystem processes, including greenhouse gas emissions, with implications for the carbon intensity of electricity generation.