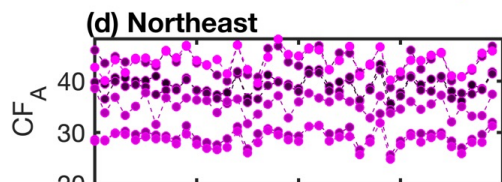
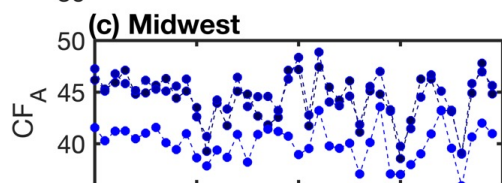
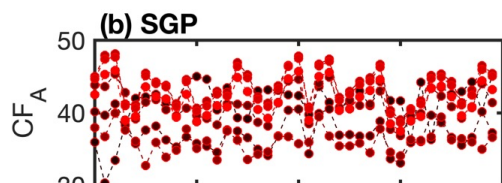
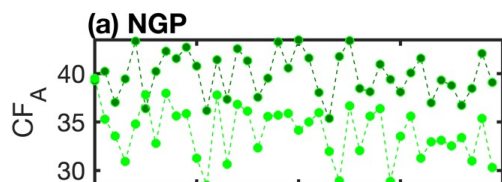


Projecting future energy production from wind farms – Part 1



Time series of normalized annual mean electricity production (CF_A) at operating wind farms in:

(a) Northern Great Plains (NGP), (b) Southern Great Plains (SGP), (c) Midwest and (d) Northeast based on the WRF simulation. Different wind farm locations are denoted by the varying hues.

Pryor S.C., Coburn J.J., Barthelmie R.J. and Shepherd T. (2023): Projecting future energy production from operating wind farms in North America: Part 1: Dynamical downscaling. *Journal of Applied Meteorology and Climatology* **62** 63-80 doi: 10.1175/JAMC-D-22-0044.1

Scientific Achievement

New WRF simulations nested within the Max Planck Institute global model are used to quantify possible changes in annual electricity generation and occurrence of production droughts (extended periods with anomalously low power generation) in the current and current climate. Changes are generally negative (lower production), regionally specific and are of smaller magnitude than historical trends due to technology innovation towards increased production.

Significance and Impact

Wind energy represents 29% of total U.S. electricity generation capacity additions over the last decade with installed capacity rising to 135 GW at the end of 2021. We quantify possible changes in electricity production from wind in different regions of the US that might arise due to greenhouse gas induced climate change.

Research Details

Simulations with the Weather Research and Forecasting (WRF) model nested in the Max Planck Institute global model for 2010-2050 are used to make wind energy projections.

