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Analysis of wind resource under heat wave conditions in southern Europe

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In recent years, renewable energy is gaining importance in the energy mix, increasing the dependence of the energy system on weather. Atmospheric patterns that affect wind energy production focusing on the winter months have been studied in previous works, as wind resource in Europe is higher for this season, but also because it is when there is a greater and more stable heating demand in Europe. Southern European countries, however, present summer demand increases due to the cooling needs of these countries (Spain, Portugal, Italy and Greece). These increases have been seen with real daily demand data from ENTSO-E (the European Network of Transmission System Operators for Electricity). Demand in Spain is even higher on days of heat waves in the 2015-2018 period, reaching in that case the annual maxima. The objective of this work is to study the wind patterns in these episodes of heat waves. Reduced overall summer wind power supply coupled with high energy demand under these conditions could be compromised. We will analyse means of daily wind anomalies on days of heat waves (composites) using data from the ERA5 reanalysis and the E-OBS temperature observations. The study of the wind resource in conditions of high energy demand due to extreme climate events, can help in the energy supply strategic planning and control to minimize the impact of these events on an electricity system with high penetration of renewables.