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An assessment of wind energy potential in Iberia under climate change

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Wind energy potential in Iberia is assessed for recent-past (1961-2000) and future (2041-2070) climates. For recent-past, a COSMO-CLM simulation driven by ERA-40 is used. COSMO-CLM simulations driven by ECHAM5 following the A1B scenario are used for future projections. A 2 MW rated power wind turbine is selected. Mean potentials, inter-annual variability and irregularity are discussed on annual/seasonal scales and on a grid resolution of 20 km. For detailed regional assessments eight target sites are considered. For recent-past conditions, the highest daily mean potentials are found in winter over northern and eastern Iberia, particularly on high-elevation or coastal regions. In northwestern Iberia, daily potentials frequently reach maximum wind energy output (50 MWh day-1), particularly in winter. Southern Andalucía reveals high potentials throughout the year, whereas the Ebro valley and central-western coast show high potentials in summer. The irregularity in annual potentials is moderate (<15% of mean output), but exacerbated in winter (40%). Climate change projections show significant decreases over most of Iberia (<2 MWh day-1). The strong enhancement of autumn potentials in Southern Andalucía is noteworthy (>2 MWh day-1). The northward displacement of North Atlantic westerly winds (autumn-spring) and the strengthening of easterly flows (summer) are key drivers of future projections.

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