Evolution of the wet snow hazard for the electricity network in Corsica in 2050

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Objectives and background

In the island territories, EDF is responsible for the balance of the electric system on the whole, including generation, distribution and demand. This responsibility brings with it the need to define an adaptation plan to climate change. In this framework, the question of the evolution of the wet snow risk for the electricity network in Corsica has arisen.

This study describes the impact study devoted to the evolution of the wet snow risk in Corsica around 2050. Wet snow designs snow precipitations occurring when air temperature is around 0°C. Under these conditions, the snow contains a large proportion of liquid water which freezes instantly when hitting a cold overhead wire. When such a snow event is abundant, then an overload builds around the cable, potentially leading to damages.

Method

In the study, a wet snow index, designed in previous analyses devoted to this hazard at EDF and based on daily minimum and maximum temperatures and daily rainfall amount, is used. This index allows identifying days with meteorological conditions able to favor the occurrence of wet snow. It is applied to the E-OBS 0.1° observations database to characterize the risk in Corsica in the current 1995-2014 period. Then, for the climate change impact study, an ensemble of 13 CMIP6 climate model projections with 4 emission scenarios (SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5) is used. The climate simulations over the historical 1995-2014 period are first bias adjusted against E-OBS 0.1° using an adapted version of the classical distribution adjustment method CDFt and their representation of the risk is validated. Then, the index is applied to the bias adjusted projections over the period 2041-2060, which leads to 13 projections for each scenario. In order to infer the statistical significance of the changes, a non-parametric test based on resampling is designed and used.

Principal findings

The results show that the frequency of occurrence of wet snow prone conditions tends to decrease with the two highest emissions scenarios, while it remains quite constant with the two lowest ones. No significant change is identified for the maximum amount of precipitations associated to the potential events.

Conclusion

The obtained results show that the risk associated to wet snow for the electricity network in Corsica is not expected to increase. The frequency of such events should at least remain unchanged with the lowest emission scenarios, or decrease, while their intensity should not change significantly.