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PARALLEL SESSION C: IMPACTS AND APPLICATIONS
C2: REGIONAL ATMOSPHERIC AND OCEAN CIRCULATION SYSTEMS

Can/will climate change impact the wind energy industry?

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It is still technically possible to limit global warming to 2ºC, but this scenario is unlikely. What will this mean for sectors like wind energy that are impacted by weather-related variables? In order for any climate change impact to be important the changes must be detectable on the lifetime of wind farms (of the order 30 years) and the resource and operating conditions must evolve beyond (sometimes poorly characterized) current variability and engineering design standards.

Despite many challenges, progress has been made both in developing tools to project climate change impacts and in quantifying uncertainties and their sources. I present an overview of those methods, limitations and results to date using examples drawn from Northern Europe and North America. In these regions, aside from areas with significant thermo-topographic forcing, the wind resource (and to some degree operating conditions) in the primary resource-rich areas, is primarily determined by the track, translational speed and intensity of mid-latitude cyclones which are increasingly well-resolved by RCMs. Accordingly dynamical and statistical downscaling of near-surface wind speed distributions exhibit skill in reproducing current wind climates, indicating it may be possible to make robust projections of wind resources and changes therein. Projected changes in wind resources in the two focus regions are generally modest: e.g. Model ensembles indicate small increases in resource magnitude or no change over Scandinavia and the US Great Plains regions to the middle of this century, but small decreases in wind resources for the US Northwest. In the near-term, differences in projected wind resources are equally or more pronounced across models than emission scenarios. Potential impacts from changes in operating conditions such as extreme winds and icing are more challenging to quantify. However, preliminary work indicates current standards provide a large safety margin that is not exceeded by projected changes in, for example, extreme wind speeds. Uncertainty remains regarding factors such as model skillful scale and also the robustness in model response to different forcings, and how both vary with model architecture. Possible approaches to addressing those issues and improving treatment of internal climate variability, and thus reducing uncertainty and risk, will be described.

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