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The ability of mesoscale meteorological models to capture severe wind event - case study

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The winds associated with winter storms over Europe can be particularly severe. The intensity of these storms and the destruction they bring make them particularly important to different activity sectors. Accurate prediction of the magnitude and frequency of extreme wind speed is important for many safety, engineering and financial applications. Using numerical weather prediction models, we can more accurately predict the cyclones observed at mid-latitudes and the winds associated with these storms.
The aim of this study is to investigate the ability of the COSMO (COnsortium for Small-scale Modeling) and WRF (Weather Research and Forecasting) models to capture a significant wind event observed during the period March 22-23, 2013. The predicted frequency and intensity of the COSMO and WRF-simulated high wind event is compared to observed wind speed and direction at the meteorological stations. Both models simulations reproduce an episode of high-momentum flow associated to the complex orography of the Romanian territory. Both models capture the synoptic features and basic trajectory of the cyclone driving the event. However, there are differences regarding the mesoscale evolution of the low pressure system that affect the forecast results, due to the differences in the initialization of the models, the horizontal and vertical resolutions as well as differences in boundary layer mixing and surface flux schemes.