Comments

Idealized WRF model sensitivity simulations of sea breeze types and their effects on onshore windfields

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General

The importance for offshore wind energy should be described in more details with respect to

- Climatological aspects (e.g. how many meteorological situations per year with sea breezes)
- Observations. There are many offshore windfarms in operation for years and the main findings of this paper should be demonstrated by selected windfarm observations.

Major points

Please describe the model used in more details

- Exact locations of the lower grid levels
- What is the effect of the restriction to 24h simulation time e.g. compared to 48h or: how sensitive are the main findings to the initial conditions?
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Please explain the very far reaching sea breezes in nearly all simulations, e.g. 250 km off-shore for the pure sea breeze case. To the reviewer this seems too extensive or: . Do the sea breeze at UK coasts really effect the meteorology in northern France or the Netherlands.

Please include results for surface temperatures in order to get an impression of the forcing for the development of the sea breezes.

To the reviewer it is of little use, when the authors describe phenomena without showing the results. “(not shown)” is used – to the feeling of the reviewer – too many times in the paper.

Minor points

Description of the model experiments in Sect. 2.1 do not match with Table 2. Please check (e.g. 2 to 10 m/s in steps of 2 vs. 0-20 m/s in steps of 1)

Sect. 3.1.1 is nightfall at 18:45? 3rd June!

Most figures, axis labelling and legends are too small

Tabel 2. A coordinate system should be included/described to define the direction of u_g. u,…

Fig.5 improve quality, explain Sigma_1,….

Fig.6 mark the location of grid levels, include times of sunrise and sunset

Fig.7 labels of hodograph are too small. What is the direction of u (coordinate system!)

Fig.8 legend too small, x-wind component = u?
The range of influence: 300 km up to 4 km onshore and 250 km offshore seems to be too extensive
The doubling of vertical extension of the onshore flow ahead of the front seems to be “surprising” to the reviewer. Please explain.
Please restrict the presentation to the interesting lower part of the atmosphere (e.g. 3-4 km)

Fig.9 please use U_g instead of V_g to be consistent with u and v.
240 km in 12 hours means a propagation speed of the pure sea breeze of approx. 6 m/s. Is this consistent with the presented results?

Fig.11 too small
Large differences between approx. 0 UTC and 24 UTC are evident. Discuss the effects of e.g. a 48h simulation on the results.
At 8 m/s the offshore extend of the sea breeze is limited (see Fig. 9). Could you please explain why
X=-300 km u(06Z) < u(12Z) and
X=+300km u(06Z) > u(12Z) ?

Fig.13 To the reviewer it is confusing, since here we see not the real extend of the sea breeze, but the specific definition used here in combination with a superimposed wind with an offshore component.
The extend for $u_{g=}0$ at 24 UTC is approx.. 240 km which is not consistent with the 260 km in Fig.9.

Fig.14 see comments Fig.8

Fig.16 Again: Would the authors expect the same results for e.g. a 48h simulation? Why the results show a decrease of 10m wind between 9-13 UTC (16b) although sea breeze and superimposed wind components are in the same direction. 14a is consistent with the expectations of the reviewer since superimposed wind and sea breeze are directed against each other.

Fig.17 title of legend is different to e.g. Fig.15; please harmonize
What is the reason for the non-symmetric wind pattern in 17c (“c” is missing in the Figure)

Fig.19 Figure too small.
At the inflow boundary at x=-300 km only for u=18 m/s from west the expected surface wind from WSW is evident. For all other superimposed winds a left turn instead of the Coriolis forced right turn is shown. Please explain.