Dear authors,

What a nice paper, very interesting!

I have made some comments as I read it along, hopefully these can be useful.

All the very best
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---Section 1---

Line 21: "in Europe". Possibly "European Union", https://windeurope.org/about-wind/statistics/european/wind-energy-in-europe-in-2018/#explore.

Line 24: "the total of all ocean-based industries". The metric used in (OECD, 2016) is "Gross Value Added".

---Section 2---

Lines 64-66: You could also mention http://projects.knmi.nl/knw/data/, https://www.dutchoffshorewindatlas.nl/ and http://marinedataexchange.co.uk/ItemDetails.aspx?id=4385.

Lines 88-89: You could also mention dual doppler RaDAR systems (BEACon project, see page 216 of https://books.google.dk/books?id=qfKZDwAAQBAJ).

Lines 93-95: " is valid in open-ocean and not near the coast". You could add a reference which helps the reader understand the reason for this (spatial averaging, water depth, fetch, or spatial/temporal heterogeneity/combination of these).

Lines 104: "due to the differences between land and sea influencing the atmospheric flow". It may be worth mentioning shortly if/when these differences are due to the physics of the model, or to the inputs (orography/roughness/SST ...) to the model (and/or a combination of these).

---Section 3---

General comment: it may be worth providing the reader with a reference to a document which explains the basic concepts of polarizations, maybe: https://earth.esa.int/handbooks/asar/CNTR1-1-5.html ?

Lines 125-126: "Wind product includes wind speed and wind direction at 10m height above sea level at spatial resolution of 12.5 km (de Kloe et al., 2017; CMEMS 2019)". What is the temporal resolution (i.e. time averaing and timestamping, for ex. 1-minute average reported 6-hourly)?

Table 2: may be worth adding the temporal resolution (see comment above).

Line 149: "the polarization ratio of Mouche et al. (2005) is selected". Not sure it is relevant here, but from the same author this newer study shows that in strong wind conditions, using VV or VH is not as good as a combination of both: https://www.researchgate.net/publication/318462216 Combined Co- and Cross-Polarized SAR Measurements Under Extreme Wind Conditions. It may be worth providing a short argumentation on why and how the CMOD5.n algorithm has been used in combination with which polarization.

Line 152: "The SAR Ocean Products System (SAROPS) software". I could not find references to the software in (Monaldo, 2015), is there another reference which can help the reader? Could it be *(Monaldo, 2005) MONALDO, F. M., 2005: ANSWRS: APL/NOAA SAR Wind Retrieval System-Software Documentation Version 3.0. Report: SRO-05-13. Johns Hopkins University/Applied Physics Laboratory, Laurel, MD 20723-6099, 36 pp.*?

Line 161: "Wind turbines offshore operate at around 100m height". Maybe rephrase using rotor span and hub height. As a side note, this is also the height up to which the MOST can be used without making a too large error in stable conditions (see the works of A. Peña).

Line 161-165: I understand that you extrapolate the mean, annualised, Weibull-fitted wind speed distribution from 10 to 100 mMSL, is this correct? That, is, you do not extrapolate from 10 to 100 mMSL for each SAR scene.

Line 175: "compared to tall meteorological mast data". Also, LiDAR data (at the IJmuiden mast).

Line 177: "was setup". Typo: "was set up".

Line 182: "CORINE land cover data". It may be worth specifying which year.

Line 183-184: "The NOAH land surface model and icing WSM5 plus ice code and sum of cloud and ice humidity". The sentence is missing a verb.

Line 185: "61 vertical layers". It may be worth providing more details, in particular in the ABL.

---Section 4---

Figure 2: The Delta_U results (bottom right) could possibly be shown as relative differences instead of absolute differences. This may better reflect the magnitude of the stability correction when comparing two areas with different mean neutral-derived 100m wind speeds.

Lines 225-231: The discussion could include high-level explanation about mean sea surface- and air temperature spatial variations over Europe, i.e.: stable conditions occur when warm air flows over cold(er) water, etc., illustrated using ERA5 T2m-SST seasonal differences (here is a #nottobeproudof example: https://twitter.com/remi_wnd/status/1130428792386801664/photo/3).

Line 240 "wind sped". Typo.

Lines 244-248. The comparison of WRF with the sat data should here be understood as comparison between WRF and WRF-corrected sat data, right ? Would it make sense to show a comparison of sat data against 10m WRF neutral wind as well ?

Lines 246-247: "a consistent overestimation of winds from SAR". The word "overestimation" is best understood (#byme) when compared with measurements, maybe use "SAR data extrapolated using WRF long-term stability show a consistent negative bias compared with the WRF values"?

Line 247: "near the Dutch coastline". Also near the North-German coastline possibly? Maybe also mention that these artifacts are visible in Figure 2.

Lines 257-258: "These are attributed to the lack of ability in ERA5 to properly resolve the coastal atmospheric flow phenomena". In particular possibly due to the coarse spatial resolution of the model, see for instance in the Irish Sea: the Isle of Man is classified as sea in ERA5, same for Bornholm, thereby the oddity visible on the map shown here. See a subset of the mask here: https://www.dropbox.com/s/0zcpyujwd1sb984/ERA5_land_mask.JPG?dl=0. As to the other differences, there are likely orography (and sometimes upwelling->stability) driven (Norway, South-East of France, Sicily, ...).

Line 265: "detail than". Missing "more".

Line 269: "ERA5 resolves scales around 150 km". Maybe add a reference. From the validation I have carried out, and others (https://www.dropbox.com/s/lx8aqky3cszuhbc/ERA5_spectra_vortex.JPG?dl=0), ERA5 seems to catch well the time variability. Offshore, the correlation of ERA5 against measurements is almost as large as with WRF (see slide 6 of http://c2wind.com/f/content/windeurope_wra_workshop_20190627_c2w_rev4.pdf and also https://www.linkedin.com/pulse/end-dynamic-mesoscale-models-wind-resource-assessment-bosch-i-mas/?trackingId=%2FhezBBaxCP0Qq68LxX8q2A%3D%3D).

Line 275: "overestimate the wind speeds". See my comment above, lines 246-247.

Figure 7: the blue and orange distributions are bimodal, what is the explanation for these? Do they correspond to different biases in stable and unstable conditions maybe?

---Section 5---

Line 285: "outline methodology". Missing "the".

Line 294: "WRF mean wind speeds". These are not corrected for stability, correct (i.e. not directly comparable to SAR-derived neutral wind)?

Figure 8: could you also add the mean annual or seasonal roses at selected locations around the island, for illustration? Maybe also the corresponding absolute mean difference between air and surface water temperature?

Lines 295-296: "A distinct jet south of the island is much more pronounced in the WRF data than in SAR". Could it be because these are Northerly (cold) winds flowing over warm water, and that the Figure compared 10m neutral wind from SAR to non-neutral WRF values? Also, there seems to be upwelling causing colder water to surface (like in the Gulf of Lion in France), see https://www.dropbox.com/s/2drn8k2oisss32i/WW_SST_crete_20170705.JPG?dl=0.

Lines 301-302: "Koletsis et al. (2010) demonstrated the sensitivity of gap wind speeds in WRF to the changes in the elevation". Just a side note, I could not find the term "WRF" in this article (I used https://core.ac.uk/download/pdf/25867194.pdf).

Figure 9: maybe show the land/sea mask in ERA5 too.

Lines 335-336: "These features are present in the SAR as well, but much less pronounced". See my comment above, lines 295-296.

Figure 11: maybe add mean wind vectors too.

Figure 12: what where the atmospheric stability conditions around the island at these timestamps? SST maps are available from NASA Worldview, see https://www.dropbox.com/sh/dyfjamboyef73om/AABlCz99giL13q99mWUrbbkVa?dl=0.

--- Section 6 ---

Line 373: "mast". And LiDAR too.

Line 399: "are crucial for optimal design of turbine layout within the 400 tender areas". From (#my) practitioner's perspective, these data are crucial to agreeing on a central estimate of the long-term annual net energy production, not so much on layout optimisation (i.e. where to place the turbines).