

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-311

Anonymous Referee #2

Referee comment on "The impact of Aeolus winds on near-surface wind forecasts over tropical ocean and high-latitude regions" by Haichen Zuo and Charlotte Bay Hasager, Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-311-RC2>, 2023

General comments:

This study examined the impact of Aeolus winds on surface wind forecast from the OSEs using ECMWF model. In general, the impact is quite small and not statistically significant at least in the tropical regions. The impact in the NH is negligible at forecast lead times < 192h. The triple collocation analysis results look very noisy and hard to interpret. It is not clear how the correlation between the OSEs will help to justify the performance of the OSEs. In summary, I do not see any significant impact of Aeolus winds on the forecast of surface winds from the OSEs.

Specific comments:

Abstract, line 13: It is not clear how do you get this conclusion: "The results show that with Aeolus data assimilation, the tropical sea surface wind forecast could be slightly improved at some forecast time steps." This is the opposite to the statement from line 175: "Unfortunately, the NDRMSEs are not statistically significant at a 95% confidence interval for all three tropical ocean regions."

Section 2.1: The resolution of the ECMWF model version is different from that of Rennie et al (2022). Have you re-tuned the specified observational error for Rayleigh and Mie winds for these specific OSEs in this study? It will be helpful to add some information about how many Aeolus Rayleigh and Mie winds are assimilated into the OSEs in the lower troposphere.

Line 120: Please explain more why those stations with weak correlations ($R < 0.5$) with the analysis should be removed. Add numbers of stations were removed.

Line 199, fig. 4: The triple collocation analyses of the two OSEs (no and with Aeolus) show no evident difference to me. Are the differences are statistically significant? This also applies to Figs. 10, 11, 12, 17, 18, 19.

Line 200: The errors from the two OSEs are <1.0 m. Can you explain more why the errors are so small, considering a typical error of ~ 1.4 m/s of radiosonde near the surface.

Line 220: It is not clear how "The correlations can reveal improvement in forecast skill between the two forecasts?" Please explain.

Line 229: Are the positive impact statistically significant? Also applies to Fig. 14.

Lines 232: The seasonal variations of error reductions may not necessarily solely due to the quality of Aeolus winds. Other factors may also contribute to this.

Line 252: why the initial error from OSE with Aeolus is so small, only ~ 0.2 m/s?

Lines 335, 387: This is the opposite to the statement from line 175: "Unfortunately, the NDRMSEs are not statistically significant at a 95% confidence interval for all three tropical ocean regions." How can you get the statement: "the research findings of this study demonstrate the potential of Aeolus observations on surface wind forecasts with the ECMWF model over the tropical ocean"?