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Comment on acp-2021-532

Anonymous Referee #2

Referee comment on "Is the ocean surface a source of nitrous acid (HONO) in the marine boundary layer?" by Leigh R. Crilley et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-532-RC2, 2021

This manuscript uses two high-quality observational datasets of HONO, NO and NO2 from atmospheric observatories at Cape Verde and Weybourne to test whether the high rates of conversion of NO2 to HONO in the marine boundary layer reported in other studies are seen at these locations. The results are important and interesting – both during the night and the day, the inferred rates constants for NO2 to HONO conversion at both sites are much smaller than recent reports. The paper is well-written, and should be considered for publication in ACP but could be strengthened by addressing the following comments:

- The authors provide information about the limits of detection of the instruments, but they don't address how observations that are below these limits are included in the analysis. For the Cape Verde site, it seems like there are often low HONO and NOx values and it would be interesting to know how these are treated in the analysis, and what impact their inclusion or exclusion may have on the results.
- The constraints on NO2 to HONO conversion during the day are complicated by the existence of another path of formation (OH + NO). The authors mention briefly that no other paths were included in the calculation, but is there any estimate of how fast the gas phase production mechanism could be?
- Because the results at these two sites are so different from other reports, it's interesting to consider what factors might be driving these differences. Is it possible that the reaction is not simply first order in NO2, and thus is higher in more polluted marine boundary layers? If a pseudo-first order rate constant is appropriate, is it likely to be governed by the uptake coefficient of NO2 at the surface (and thus influenced by SML composition) or are there likely to be mass transfer limitations in the atmosphere that restrict the reaction? Do the authors have measurements of a aerodynamic and boundary layer resistance to deposition at either of the sites?