

Interactive comment on “Modeling the regional impact of ship emissions on NO_x and ozone levels over the Eastern Atlantic and Western Europe using ship plume parameterization” by P. Huszar et al.

Anonymous Referee #1

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This article deals with the non-linear effects during dispersion of NO_x emissions from ships on atmospheric O₃ and NO_x levels by applying a ship plume parameterization in regional chemical transport models. I suggest publication of the article after taking into account a number of specific comments written below.

Specific comments Page 26743, line 24: I would suggest the authors to specify which convective scheme is used for their RegCM3 simulations.

Page 26746, lines 4-5: The authors note that the initial and boundary conditions for the

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climate runs were interpolated from the ERA40 reanalysis. However the year chosen for the simulations was 2004 but ERA-40 reanalysis stops in August 2002 (http://data-portal.ecmwf.int/data/d/era40_daily/). I think that authors should clarify what kind of meteorological data they have used for initial and boundary conditions.

Figures: From my point of view Figures 4 and 5 are similar and can be possibly merged into one common Figure with both the absolute and relative (in percent) difference due to ship emissions for summer and winter. Also I would suggest that Figure 4c (for the whole year) may be skipped in the new Figure 4 and the authors may only mention these results in the text without illustration.

In Figure 8, at the left panel plots, as the values get more negative the color scale becomes more violet while at the right panel plots is the reverse order. In Figure 7 as the values become more negative the color gets redder. I suggest that the authors use a common color order for positive or negative values.

According to Figure 8 ship plume effects lead to decrease of ozone due to suppressed ozone production resulted from the fraction of NO_x remaining in the plume form. This ozone decrease is more evident along the shipping corridors. Furthermore since a certain NO_x fraction remains within the plume we also note a NO_x decrease (according to Figure 7) along the shipping corridors. My question is if the NO_x decrease outside the plume (along the corridors) would lead to less NO titration by O₃ and hence an O₃ increase thus counteracting partially the decrease of ozone due to suppressed ozone production resulted from the fraction of NO_x remaining in the plume form.

Page 26753, lines 10-14: The authors state “The simulated effect varies substantially between winter and summer despite the fact that ship emission’s variation throughout the year is not large. The reason is in the different meteorological conditions (primarily temperature) and in the consequent photochemical processes.”

How is concluded that primarily temperature is the reason for the differences in the simulated effects in summer and winter. Why not the radiation? Please clarify.

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Technical corrections

Page 26750, line 14: “ by the introduction the plume parameterization.” should be “by introducing the plume parameterization.” or “ by the introduction of the plume parameterization.”

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 26735, 2009.

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