Atmos. Chem. Phys. Discuss., 12, C4325–C4327, 2012
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements and modelling of ozone in the Mediterranean MBL: an investigation of the importance of ship emissions to local ozone production" *by* I. M. Hedgecock et al.

Anonymous Referee #1

Received and published: 5 July 2012

The authors present a model analysis of ozone and precursor data collected on ship cruises in the Mediterranean Sea over several years. In particular, they investigate the impact of ship emissions on ozone levels.

The manuscript requires significant revisions before it will be suitable for publication. I encourage the authors to address my concerns and to resubmit.

My main concern with the manuscript is that the model does a rather poor job of reproducing the ozone data collected on the ships and by stations on land (EMEP). Absolute

mean biases are as high as 30-40%, which are often higher than your model estimate of the impact of ship emissions on ozone. Undoubtedly, ship emissions have an important impact on pollution in the Mediterranean Sea, but I find it difficult to believe the conclusions concerning the impact of ship emissions on ozone and compliance with the ozone standard.

My first reaction to this model output is that more thought needs to be put into understanding the source of the model's poor performance. Have you investigated the source of the temperature high bias? Could the chemical and aerosol mechanisms be the issue? Aerosol chemistry within the ship plume? This wonderful shipboard dataset will allow you to explore these issues with your model.

General Comments

There are quite a few grammatical errors throughout the manuscript.

The manuscript is too verbose. Please make your points more concisely.

Introduction: The literature is well cited and the study is well justified. However, the scientific objective of the paper is lost in the confusing text of the final paragraph. It is unclear whether you are citing earlier work or saying what the objective of your work is. Please make this clearer. Also, please make it clear what is new and exciting about your work.

Sec. 3.1.3. The RADM2 mechanism is very, very old and dated. Could this contribute to your model's problem simulating the observed ozone?

Sec. 3.2. There are newer emission estimates of biogenic fluxes from Guenther. Why do you use emissions developed in the 1990s?

Sec. 3.2.1. You don't mention in-plume aerosol chemistry that you use. There is quite a bit of discussion in the literature on the chemistry in plumes that is not related to the dilution effect that you discuss.

Sec. 4.1.2. Why don't you show a few comparisons of the model and observations along the ship paths for ozone? The same goes for your discussion in Sec. 4.2 and 4.3.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 16557, 2012.