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Interactive comment on “Modeling ozone plumes observed downwind of New York City over the North Atlantic Ocean during the ICARTT field campaign” by S.-H. Lee et al.

Anonymous Referee #1

Received and published: 24 May 2011

General Comments

This is a good paper that uses the WRF-CHEM model to analyse observations (predominantly airborne measurements) from the ICARTT field campaign, to investigate the transport and evolution of pollution from the New York area out over the Atlantic. A key feature is the transport of the pollution plumes above the stable marine boundary layer, decoupling the pollutants from the surface. WRF-CHEM is run with different chemical initial and boundary conditions (IC/BCs), showing that anthropogenic and biogenic emissions from N. America are important on the background levels of pollutants observed and that biomass burning plumes also impacted the area during the cam-

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paigned. The paper helps to further understand the ICARTT observational data and also illustrates the importance of IC/BC in regional model studies.

This paper is well written. On the whole the description of the work performed and the discussion is detailed and thorough. The paper should be published in ACP, subject to a few minor points below.

Specific Comments

A major aspect of the paper is the impact of the IC/BCs, specifically dynamic IC/BCs. However, what is not very clear to me is the way these are treated in the control run. There are a few places in the text (e.g. page 14040, lines 22-25; page 14055, lines 18) which seem to imply that the control run had no chemical IC/BCs, where as in fact prescribed static chemical IC/BCs were employed. i.e. the text states that chemical IC/BCs are used in the sensitivity runs so thus implies that they were not in the control run.

The only description of the BCs that I can find for the control run is on page 14040, lines 15-16, which states “Model lateral boundary conditions applied for chemical species are constant inflow and zero gradient outflow conditions in the coarse domain”. It is not clear to me what this means. A more detailed description is required. Although (page 14040, line 22-) describes the experimental set up of the chemical IC/BCs for the sensitivity runs, it never defines this as being “dynamic” or exactly what this term means in this context.

The text needs to be much clearer and consistent in the defining the type of IC/BCs used.

The other implication of these bits of text is that using IC/BCs (or more specifically dynamic IC/BCs) increases the simulated ozone. It does in the simulations considered, but surely this depends on the IC/BCs that might otherwise be used in the control run. Be careful not to imply more than is justified.

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A brief description of how the WRF-CHEM data for the flight tracks was extracted from the model output would be useful.

Technical Corrections

Page 14044 , line 8, it would be useful to state in brackets after the MBE values quoted which day they each relate to.

Page 14044 , line 14, “at” the two urban stations

Page 14055, line 9-16, discusses Figure 14. Although comparing panels a and b of the figure demonstrates that the model captures the general chemical aging behaviour observed, I would be interested to see correlation plots between the model and observed data of say NO_x/NO_y to assess this more quantitatively.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 14031, 2011.

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