Interactive comment on “Modelling multi-phase halogen chemistry in the coastal marine boundary layer: investigation of the relative importance of local chemistry vs. long-range transport” by D. Lowe et al.

R. Sander (Referee)
sander@mpch-mainz.mpg.de

Received and published: 17 October 2010

Lowe et al. present interesting model calculations of tropospheric halogen chemistry. I recommend publication of the manuscript in ACP after making minor changes as described below.

Scientific Comments

• The introduction contains very long descriptions of the models by Leigh et al. (2009) and Mahajan et al. (2009a). Since this is not a review paper, I don’t think it is necessary to describe the models of other studies.

• p. 19440, l. 9: Does the value of 0.8 really refer to the molar Cl/Na ratio or is it the chlorine enrichment factor compared to sea water composition? Note that the molar Cl/Na ratio of sea water is not equal to one.

• p. 19441, last paragraph: Could you briefly mention what in your opinion is the reason for the discrepancy between measured and modeled OIO?

• p. 19441, l. 27: What is the meaning of the word “only” in “only 5-2.5 times the detection limit”? If it is above the DL, it should still have been detected.

• p. 19442, l. 10-11: I don’t understand “before increasing equally markedly at the end of the bursts”. As far as I can see from Fig. 3, reactive chlorine and bromine remain low until the next burst starts at about 11.93.

• conclusions, last paragraph: If NO$_x$ is not uniformly distributed, it would also be possible that local patches of BrO exist in areas with low NO$_x$.

Technical Comments

• Please add the physical units to all quantities, especially to Tables 1 and 5, and also to Equations (2) and (4).

• Please define all acronyms that you use, e.g.: “PD-FiTE”, “LT”.

• p. 19430, l. 24: Change “Odowd” to “O’Dowd”.

C8807
• p. 19431, l. 10: The sentence starting with “Which” seems to be incomplete.
• p. 19431, l. 27-28: Change “pptv” to “pmol/mol” here (and also elsewhere).
• p. 19434, l. 13-14: I agree with the other reviewer that the complete chemistry mechanism should be published in a supplement instead of just citing other papers on which it is based.
• p. 19436, l. 3: Is $K_e$ proscribed or prescribed?
• p. 19437, l. 26: Are the numbers describing the composition based on mass fractions or molar fractions?
• p. 19443, l. 3: The word “if” is probably missing here.
• p. 19444, l. 19: The word “are” is probably missing here.
• Tables 3 and 4: Please gives the references from where these values are obtained. If they are your own estimates, please mention it in the table captions.
• Table 5: Is the denominator of the function really $d\gamma$? I think it should probably be $d\ln \gamma$ or $d\ln r$.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19429, 2010.

C8808