

## Introduction

The manuscript describes a relatively well-organized effort to understand the importance of two well-known difficulties in regional photochemical modelling of ozone and PM<sub>2.5</sub>. These are: emissions inventory weaknesses and the cutoff value of the diffusion coefficient. The study explores these questions in CMAQ and AURAMS models over a domain containing the Lower Fraser Valley of British Columbia.

Study conclusions are carefully drawn and are of substantial significance and interest to the regional photochemical modelling community. Most important, the conclusions relating to compensating errors are likely to be of relevance to models beyond those used: CMAQ and AURAMS.

## General Comments

The manuscript is very well-written and presented, with a few minor, low level weaknesses that can be implemented in a simple revision.

## Specific Comments

- 1) Pages 5599 and 5600: The term “science processes” is a very strange one. The authors are clearly not referring to the processes of science as a scholarly activity, which is what the term literally can only mean. What they are referring to is physical and chemical processes captured by the computational models.
- 2) Page 5601, line 4: The use of UTC here is odd. All processes referred to in the study are more closely related to local time. Later in the manuscript the authors use LST. I suggest that should be used here.
- 3) Page 5602, line 6: The “in” in this line is redundant.
- 4) Page 5606, line 17 and Figure 1: The proper name is Vancouver International Airport. All 5 monitoring stations in the LFV should be named in the caption to Figure 1.
- 5) Page 5607, line 3: “...concentrations of which were higher in...” appears to be a part of an incomplete sentence.
- 6) Page 5608, lines 16 & 17: The term “higher level(s)” appears to refer to higher concentration levels of ozone, but could easily refer to higher (altitude) levels in the model.
- 7) Page 5613, line 16: “..to which that diurnal emissions..” appears to be either incomplete, or contain a redundancy.
- 8) Page 5614, lines 15 to 17 and Tables 4b and 5: The sentence “Normal font .... base cases” is redundant at this point in the text, but should be incorporated into the captions to Tables 4b and 5.
- 9) Page 5620, line 13: “differences” should be “difference”.
  - 1) Table 3: The definitions in this table are standard, and well-known. The table could be deleted without detracting from the paper.