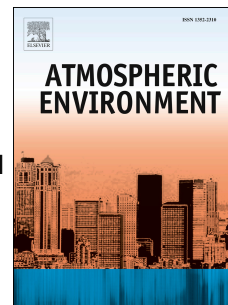


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Comparison of impacts of aircraft emissions within the boundary layer on the regional ozone in South Korea

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1 Comparison of impacts of aircraft emissions within the boundary layer on the 2 regional ozone in South Korea

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8 9 **Abstract**

10 In this study, the air pollutants emitted from aircraft within the boundary layer (BL) were investigated
11 for their impacts on the ozone (O₃) concentration at and around three international airports (Incheon,
12 RKSI; Gimpo, RKSS; and Jeju, RKPC) using the WRF-CMAQ modeling system during the summer of
13 2010. The analysis was performed using two sets of simulation scenarios: (1) with (i.e., TOTAL case)
14 and (2) without aircraft emissions (i.e., BASE case). The model study suggested that aircraft emissions
15 within the BL over the three airports can have a significant impact on the O₃ (and NO_x) concentrations in
16 the source regions (the airports) and their surrounding/downwind areas. A significant negative impact of
17 aircraft emissions on the O₃ concentrations in the late afternoon (19:00 LST) was predicted near the three
18 airports with their largest impact of -20 ppb near the RKSI at 19:00 LST. This was attributed mainly to
19 the high NO_x conditions in the VOC-limited areas and possibly in part to the rapid titration of O₃ by NO
20 around these airports. The rate of photochemical O₃ destruction due to the aircraft emissions near the
21 three airports was the most dominant contributor to the O₃ levels compared to the other physical
22 processes.

23
24 **Keywords:** Aircraft emission; Airport; Photochemical destruction; O₃; NO_x emissions; WRF-CMAQ

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