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## ***Interactive comment on* “Seasonal variation of ozone and black carbon observed at Paknajol, an urban site in the Kathmandu Valley, Nepal” by D. Putero et al.**

### **Anonymous Referee #3**

Received and published: 18 September 2015

#### General Comments:

Putero et al. present the first full year analysis of the simultaneous observations of the short lived climate forcers/pollutants ozone and black carbon (measured as equivalent black carbon) as well as aerosol number and mass concentration at a site in the center of the Kathmandu metropolitan city, Paknajol (Nepal). The measurements allow for a detailed analysis of seasonal and diurnal changes in the trace gas and aerosol concentration. The characteristics for the seasonal and diurnal cycles are linked to either local sources of pollution or larger scale processes (e.g. atmospheric circulation) compared for four different seasons, including pre-monsoon, monsoon, post-monsoon and winter.

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Local pollution sources are considered to be the major contributor to the observed in general very high levels of short lived climate forcers/pollutants that lead to persistent poor air quality conditions in Kathmandu. The authors propose these data to be very useful for implementing mitigation strategies for the occurrence of acute pollution levels. The paper is well written and the observations are discussed in sufficient details. I recommend publication after some revisions listed below:

Specific comments:

1) page 22534, line 1 ff: Was the start point (initial coordinates) for the 5 days back-trajectories only located at the measurement site itself or did the authors consider calculating back trajectories on a grid at different altitudes around the measurement station (variation of the initial coordinates) to increase the confidence for the results in the complex topography besides choosing the start altitude at 600 hPa to account for the complex terrain?

2) page 22538, line 6: It would be helpful to list some details on the meteorological component contributing to a morning return of pollutants.

3) page 22541, line 1-2: What is the reason for the PM1/PM10 ratio being generally higher in European cities? A reference for this statement would be helpful.

4) page 22544, line 5 ff: The authors use a recurrent neural network model to distinguish between contributions from photochemistry and dynamics to the observed O3 mixing ratio. Does this analysis allow for a more detailed budget analysis for ozone leading to absolute and relative numbers for the contribution of the different processes which can be included in this section?

5) page 22548, line 7 ff: What are the timescales for the transport of the polluted air masses to the measurement region? For example Roelofs et al., 1997 and Andreae et al., 2001 report ozone production rates of 10 ppbv/day and higher in air masses affected by biomass burning emissions. Are the transport timescales long enough for

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sufficient ozone production to explain the O<sub>3</sub> enhancement observed in the diurnal cycles?

Technical corrections:

page 22529, line 13: ...the analysis of seasonal changes of the diurnal cycles and the correlation... (?)

page 22529, line 15: ...during the afternoon/evening. This could be related. . .

page 22530, line 24: ...during the period 2005 -2015. By 2015, there... .

page 22532, line 9: ...As reported by Panday and Prinn (2009) and Panday et al. (2009)... .

page 22532, line 21: ...measurement activities, including aerosol and trace gas measurements, were started... .

page 22532, line 23: ...UV-absorption analyzer... .

page 22536, line 36: ...shown in Panday and Prinn (2009) and Panday et al. (2009),... .

page 22537, line 18: ...what is reported in a previous study... .

page 22540, line 11: ...than those of Giri et al. (2006). This is... .

page 22540, line 26: ...dust outbreak episodes (Alastuey et al., 2005) and dusty roads... .

page 22541, line 9: ...These analysis refer to... .

page 22541, line 24: ...and aerosol particles... .

page 22547, line 6: ...Friedl et al., 2010). This methodology... .

page 22548, line 22: ...opposite to what was observed... .

page 22549, line 1: ...the analysis of the seasonal change of the diurnal cycle... (?)

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page 22550, line 7: ...guidelines for O3 (?) based. ...

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 22527, 2015.

**ACPD**

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