Reviewer #3:

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. 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.
We thank the Reviewer for his/her valuable suggestions and his/her encouraging evaluation. In the following, we report our point-to-point replies to each of the raised points. Modifications to the text are performed in the revised version of the manuscript and are marked in red color.

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?
In our analysis we considered several sets of back-trajectories, starting at different altitudes above the measurement station (i.e. 500, 1500 and 2000 m a.g.l.). The final choice of retrieving only those starting at roughly 600 hPa was made because the lower ones were often impacting the complex orography that characterizes the area around the measurement site. Moreover, it has to be noted that in this work we used isentropic (and thus not kinematic) back-trajectories: this because, taking into account the large uncertainties which can affect back-trajectory analysis based on "global" meteorological data like GDAS in a complex topography, we were mainly interested in understanding the impact of large-scale meteorological scenarios (and related atmospheric circulation) to the atmospheric composition variability in Kathmandu, rather than attributing the exact source regions to each cluster.

2) page 22538, line 6: It would be helpful to list some details on the meteorological component contributing to a morning return of pollutants.
The mechanisms contributing to the morning return of pollutants are fully explained in Panday and Prinn (2009) and Panday et al. (2009). Basically, during night-time, the radiative cooling of mountains (i.e. the Kathmandu Valley's flanks) generates downslope (katabatic) winds, which establish a flow of cold air towards the basin bottom. These parcels of relatively cold air flow underneath the less cold and less dense (but also more polluted) air mass which is already present, consequently lifting this "polluted air-mass pool" above. The rising of this polluted air-mass is active along the night (causing thus a night-time minimum in pollutants at surface, see

Figure 3), as the cold and cleaner air masses keep on descending from the valley flanks. In the early morning, the mixed layer starts to grow, causing the downward mixing of such polluted air-mass back to the city.
We included a brief description of this phenomenon in the text, by modifying as follows (Page 22538, Line 6): "Moreover, also a meteorological component cannot be ignored: this is due to the presence of katabatic winds that lead to the uplift of surface polluted air-masses during the night. The following build-up of the morning mixed layer favors the downward mixing of pollutants back to the valley's bottom (Panday and Prinn, 2009; Panday et al., 2009).".

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.
The main reason impacting the PM_1/PM_{10} ratio in the Asian cities is the higher presence of dust in the roads (being also a lot of them unpaved, e.g. in Kathmandu), leading to higher dust resuspension in the latter ones, with respect to the European cities. We did not find a reference comparing European and Asian cities; nevertheless, many papers reported values of 0.56-0.71 in Milan -Italy- (Giugliano et al., 2005), 0.5-0.6 in Vienna -Austria- (Gomiscek et al., 2004), and 0.33-0.42 in Athens -Greece- (Theodosi et al., 2011).

Giugliano, M., Lonati, G., Butelli, P., Romele, L., Tardivo, R., and Grosso, M., 2005. Fine particulate (PM2.5–PM1) at urban sites with different traffic exposure. Atmospheric Environment 39(13), April 2005, Pages 2421–2431.
Gomiscek, B., Hauck, H., Stopper, S., and Preining, O., 2004. Spatial and temporal variations of PM1,PM2.5,PM10 and particle number concentration during the AUPHEP—project. Atmospheric Environment 38, 3917–3934.
Theodosi, C., Grivas, G., Zarmpas, P., Chaloulakou, A., and Mihalopoulos, N., 2011. Mass and chemical composition of size-segregated aerosols (PM1,PM2.5, PM10) over Athens, Greece: local versus regional sources. Atmospheric Chemistry and Physics 11, 11895–11911.

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?
We thank the Reviewer for this suggestion. Comparing the simulation that uses as inputs in the model all the parameters with the simulation that includes only wind speed as input data (see Fig. 6), we can conclude that photochemistry contribution varied as a function of the hour of the day, ranging from 6% to 34%. Two new sentences have been added to the paper: (Page 22544, Line 9) "The photochemistry contribution varied as a function of the hour of the day, ranging from 6% to 34%." and (Page 22549, Line 2) "photochemistry (which contribution ranges from 6% to 34%)".

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 sufficient ozone production to explain the O3 enhancement observed in the diurnal cycles?

In this work we specifically considered only fires occurring in the Southern Himalayas (SHI) box ([26, 30]x[80, 88]), considered the main area for open fire emissions contributing to O_3 and BC variability in Nepal (Putero et al., 2014). In that work the emission age (in hours) during wildfires was estimated, resulting 1.8 days on average; moreover, for 50% of the analyzed cases the last active fire had been overpassed by air-masses in the last 24h before reaching the measurement site. In our analysis we observed that, for WES and REG clusters (which were the most occurring during wildfire events) the transport timescale was comprised mostly within 24h. With all of this information, we can conclude that it is sufficient for explaining the O_3 enhancement. However, it has to be noted that the O_3 production from wildfires is a tricky process which may have different timescales, since it involves several variables, such as fire emissions, chemical and photochemical reactions, aerosol effects on chemistry and radiation, local and downwind meteorological patterns, as fully explained in Jaffe and Wigder (2012).

Jaffe, D.A., and Wigder, N.L., 2012. Ozone production from wildfires: a critical review. Atmospheric Environment 51, 1-10.

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

All of these technical corrections have been applied in the revised version of the manuscript.