General comment: This study presents flux of CO2 measured at three different types of locations (urban suburb and rural) in Sakai, Osaka. The fluxes have been calculated using the eddy covariance method. In summary, the paper presents important result about the variations of flux in different time scales. The data looks reliable and worth reporting. However, I am not fully satisfied with the discussion which is largely qualitative and very brief. Therefore, there is a significant scope to improve the draft considering following aspects.

Thank you very much for your constructive comments, editing, and encouragement. Based on the reviewers' comments, we have revised the manuscript. The revised manuscript has been edited using a NPG Language editing service. All revisions for reviewer 2 comments are marked as green and red for reviewer 1 comments in the revised manuscript. The edited by the NPG Language editing service was marked as purple.

(1) The experimental uncertainties in the measurements of eddy parameters (CO2, winds, etc.) have not been reported. In the "Observations" section, the errors and calibration procedure should be presented in details. The variations of meteorological parameters (wind parameters, RH, temp) should be presented (Figures, wind rose) for each season.

We have added the description about the intercomparison about CO_2 fluxes from the open- and closed-path eddy covariance for the OPU in Lines 165-166, calibration information in Lines 175-183, flow statistics for validity of turbulence in Lines 212-217 for showing measurement uncertainties.

We agree that showing meteorology is very important. We have also added the new section "*3-1. Meteorological characteristics*" in Lines 287-300 and new figures (Fig. 2 & 3) for showing general characteristics including air temperature, humidity (VPD), precipitation, and wind rose. Wind rose in each season has also been added in Fig. A1.

(2) The authors should work to make proper statistical representations of results (using mean, median, percentiles, standard deviation, etc.). None of the representations (figures) used in the paper show the variance of CO2 flux on daily, weekly and monthly scales. Accordingly, the discussion is "overall" but not the "detailed".

We have added the statistic throughout the documents. For example, in the section "*3-2. Diurnal variations*", statistical analyses and information about statistical significance have been added in Lines 303-329. We have added standard deviations in Fig. 8 and statistics in Lines 350-352, and Lines 364-365 for representing variation in the weekly analysis.

Including variances in the all figures are difficult, because large variances associated with other factors may mask the mean values. Consequently, we have added new Fig. 5 to show how half-hourly data had variance.

(3) About the results and discussion, sometimes I am confused to see overlaps between the interpretations of data for different sites. Hence, the important governing processes at each site. This is because the discussion is not structured and very brief. For example, the results of "3.1 Diurnal variations" "3.3 Weekly variations" at all sites have been summarized just in few lines. Therefore, it is difficult to follow and appreciate the discussion.

We have fully revised the section for "*3.2 Diurnal variations*" for adding further details in half-hourly fluxes in Lines 302-329, where new analysis for light-dependency of CO_2 fluxes in IZM and OPU in Lines 266-272 and new Figure 5, showing important governing processes. Consequently, we have divided this section into two paragraphs for showing fluxes in urban built-up and rural/park areas. Since statement in "*3.4 Weekly variations*" could be simple, we have only added statistics for showing significance.

(4) Additional analysis: It would be interesting to see how the diurnal flux changes with weather conditions in each season. For this, I suggest to separate the data, at least for rainy, cloudy and clear-sky days in each season. Please provide the diurnal flux figures measured under distinct weather conditions (rainy, cloudy and clear sky)

We agree that it is interesting to show the diurnal fluxes with different weather conditions. We have added this in new Figure A2, where the daytime CO_2 emissions for the urban built-up was large in sunny days (Fig. A2a, b), and daytime uptake in the rural area was greater in sunny days (Fig. A2e). We have added these results in "*3.2 Diurnal variations*" in Lines 210-314 and Lines 323-329.

(5) English should be improved, sometimes choice of word and phrase are not appropriate.

We apologize for our poor English. Although the previous manuscript was edited using the NPG Language editing service, we have edited again the revised manuscript using the NPG Language editing service. The edited sentences have been shown as purple.

(6) Overall, the paper looks a kind of well written report. However, a scientific paper requires more detailed representations of both results and discussion. Some specific comments are given here:

Thank you for your constructive comments. We have revised the manuscript based on your general and specific comments.

Page 1 Line 14-16: Following sentence is ambiguous and needs to be re-written. "In contrast, the dense and moderately urban areas exhibited higher emissions in winter and summer months, when emissions significantly increased as air temperature increased in summer and air temperature decreased in winter."

We have revised the sentence as "In contrast, the dense and moderately urban areas emitted CO_2 in all seasons. CO_2 emissions in the urban areas were high in the winter and summer months, and they significantly increased with the increase in air temperature in the summer and the decrease in air temperature in the winter." in Lines 29-33.

Page 1 Line 25: In this sentence, I do not find the logic to use "Consequently, ..."

We have revised the sentence as "Urban areas account for only a small percentage of the earth's land surface but emit 30–50% of total anthropogenic CO_2 (Mills, 2007; Stterthwaite, 2008), and thus, cities are important sources of the global CO_2 emissions. The CO_2 emissions among global cities are highly heterogeneous (Mills, 2007; Nordbo et al., 2012), and the temporal variability is high (Velasco and Roth, 2010). To evaluate the spatio-temporal variabilities in CO_2 emissions for global cities, studies using multiple methods, such as measurements (Velasco and Roth, 2010) and emission inventories (Oda and Maksyutov, 2011), are currently conducted." in Lines 45-52.

Page 1 Line 27: " Global CO2 emissions have often been estimated using inventories ..." I do not understand this, what do you mean by "inventories" here ?

We have revised the sentence as "Global CO_2 emissions have often been estimated using emission inventories based on point source databases, statistics for national and regional CO_2 emissions, and satellite remote sensing (Oda and Maksyutov, 2011)." in Lines 53-55.

Page 2 Line 15: "because vegetation fraction can be correlated with anthropogenic activities. " How?, an explanation is required.

We have revised the sentence as "Multi-site eddy covariance towers were used to synthesize

the data and showed that green fraction was the index that explained the spatial variability in annual CO_2 emissions (Nordbo et al., 2012; Velasco and Roth, 2010; Ward et al., 2015), because the green fraction has many possible factors that determine CO_2 emissions: a greater green fraction correlates to lesser road and population densities (Nordbo et al., 2012)." in Lines 77-81.

Page 3 line 1: " according to the apanese Meteorological " Spelling issue, please correct

We have corrected the typo.

Page 4 line 19: Following sentence needs correction "using" has come twice Turbulent fluxes were calculated using the eddy covariance method using the Flux Calculator program

We have revised the sentence as "Turbulent fluxes were calculated with the eddy covariance method using the Flux Calculator program (Ueyama et al., 2012)." in Lines 187-189.

Page 6 " 3.1 Diurnal variations" The discussion in this section is very qualitative. It is needed to be more quantitative in terms of site to site variations represented by suitable diurnal statistical analysis?

As answered in general comments 2, 3, and 4, the section for "*3.2 Diurnal variations*" has been fully revised shown in Lines 303-329.

Page 6 3.2 Seasonal variations Again, the discussion in this section is very qualitative. It is needed to be more quantitative in terms of site to site variations represented by suitable seasonal statistical analysis?

Description for seasonal variations, we has added statistics in Lines 346, and 350-352. Further discussion for the seasonal variations has been added in the discussion section in Lines 414-415, and 427-436, based on the reviewer 1 comments.

Page 6 Line 22-23, Previous studies .....our city. This sentence is not clear, what authors wish to convey?

We have revised the sentence as "The green fraction was a useful index that explained the spatial variability in the annual CO_2 fluxes, as suggested in global scale studies (Nordbo et al., 2012; Velasco and Roth, 2010). The relationship based on eddy covariance data within

a single city could be useful to evaluate CO_2 emissions at the city scale." in Lines 526-530.