Reply to the review of Anonymous Referee #2

We would like to thank Reviewer #2 for his/her useful suggestions and comments which we have addressed briefly below. For clarity, we keep the reviewer's comments in black while our response is in red font.

General review:

The last decade has seen an unprecedented rise in greenhouse gases in the atmosphere mostly due to anthropogenic activities. In order to cutback on the greenhouse gas emissions we need to calculate accurately the greenhouse gas budget. The paper being reviewed here delineates a fine approach in that direction. The paper describes measurements from an old radio tower in Switzerland. Tall tower measurements as has been correctly pointed out in the paper are not effected by local fluxes, suitable for investigating the well-mixed boundary layer, constraining regional scale greenhouse gas fluxes. The paper describes further details about the tower project about the five sampling heights at which the tower measures the greenhouse gases and other meteorological variables. The intricate details about the experimental set up in the tower are also described in details. A novel approach using multiple linear regression model to amend the temperature and instrumental biases for target gas and ambient measurements has been explained. The time series for carbon dioxide shows a maximum during winter months and a minimum during summer clearly depicting the biogenic uptake. The time series of CO shows a minimum in summer as expected due to the seasonal variation of OH radical.

Major recommendation to be accepted:

The experiments as described in the paper should be carried out in an air-conditioned room. The results in the paper clearly show that there are considerably large differences in CO mixing ratios obtained by simple calibration method and the novel multiple linear regression method. The paper ascribes these differences to a 'stonger temperature effect' of CO than either CO2 or CH4. However as a reviewer I feel this needs to be verified by carrying out the experiments in an air-conditioned room and observe whether the large differences in values for CO mixing ratios still persist.

We agree that a laboratory study under controlled conditions would be useful to investigate the temperature effects on CO, CO_2 and CH_4, and in particular to separate effects associated with the Picarro instrument from effects associated with the calibration system/gas cylinders. Such a laboratory study is under way by our group. Meanwhile, as explained in details in our reply to referee#1, the analyzer's DAS temperature range is significantly lowered after installation of the AC system in May 2015. Please see comments to referee#1 for details.

Minor recommendations:

The terms 'high span' and 'low span', 'target gas' are used frequently in the paper. However these terminologies not used universally so these terms need to be explained in the paper.

We have now added/modified the sentences below to section 2.2.2 to define these calibration gases as follows.

Following standard practice, these calibration gases are named as high span (HS) and low span (LS) referring to their relatively high and low mixing ratios of CO, CO_2 and CH_4, respectively, and their concentration is expected to bracket the ambient air concentrations.

A calibration gas (referred as Target (T) hereafter), also prepared by Empa and filled in a 30 L aluminum cylinder (Scott-Marrin Luxfer, USA), is measured once a day, and shifted by 15 minutes every day to evenly distribute the measurements over the course of a day through time in order to check the overall system performance and accuracy of the measurements.