Interactive comment on "Verification of anthropogenic VOC emission inventory through ambient measurements and satellite retrievals" *by* Jing Li et al.

Anonymous Referee #2

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General description: This manuscript presents work to verify anthropogenic emission inventories for the Beijing, Tianjing, Hebei area of China using a set of ambient VOC measurements made at a site in Beijing and satellite retrievals. They developed the inventory, performed a PMF analysis of the ambient data to evaluate the source structure and then evaluated the spatial distribution with satellite derived emissions. This is potentially important work a emission inventories are crucial as inputs for air quality models and thus for driving air pollution abatement strategies. It is therefore important that the inventories are accurate and comparison with emissions derived from measurements is an important tool to ensure this. The work is within the scope of ACP, however there some weaknesses that need to be addressed before final publication.

General comments: The emission inventory was constructed using activity data but there is no discussion as to where this came from. More detail should be given as to the source of the activity data.

Is there any temporal variation in the inventory? Presumably the activity data is time dependant (e.g. seasonal, hour of day). It would be important for the inventory to have temporal scaling factors in order for it to be used in models.

Could the authors comment on the representativeness of the PKU site for comparison with the 3kmx3km grid square of the inventory? It is difficult to use point measurements to compare to an emission rate for a much larger area so I wonder how use this comparison is?

There are many parts of the manuscript where quite vague statements on the comparison between the inventory and the measured emissions are given. For example the paragraph starting on line 274 states that a majority of NMHC agree within +- 100% with the inventory. What do the authors mean by a majority? How many agreed within 50% or 25%? Also in the paragraph starting on line 287 they state that annual emissions for alkenes, except ethene correlate well. What does 'well' mean in this case. In general the authors need to be a bit more quantitative in their statements of the degree of correlation between the inventories and the measured emissions.

Specific comments: Line 37: Better to dsay 'production' rather than 'ambient concentrations' of secondary pollutants. Line 99: Where do the emission factors (EFs) come from, please provide a reference. Line 144: What international calibration scale is the standard used for calibrating the instrument tied to? Line 175: Please provide more information here. Is there a reference for the MarcoPolo project apart from the website? What chemical transport model is used? Section 3.2.1: Quite a lot of space is given to describing the time series of the VOC measurements here but it is not really put into context with the emissions. Maybe the section could be expanded to also describe how local meteorology and long range transport affects the concentration of the VOCs as

well as their local emissions? Line 261: It is stated that all species except ïĄć-pinene and C2F2Cl3 were related to CO. Is this also true for other biogenic species such as isoprene?

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