We would like to thank the Editor and the reviewer for their comments on our paper. We appreciate the time that they have taken to read our manuscript and their comments and suggestions. Our replies to each of the referee comments are given below in blue.

Reviewer 1

This manuscript presents five different emission inventories that cover the Asian region, specifically, China. It then compares and contrasts the differences in the inventories by air pollutant for China as a whole and broken down into a number of regions. Finally, three of the inventories are used to initiate some model runs to understand the implications of the differences outlined in the earlier sections. Overall, this is an informative paper, but rather straightforward. It would be good if the authors could dig into the differences a bit deeper and aim to understand the reasons behind the differences more than just presenting them. To a certain extent, I'm sure that the reasons behind these differences may not be easily discovered (if at all) since much of what is behind emission inventory construction is often not well documented, however, this paper really stays at the surface. Digging deeper would provide information that would be much more useful to modelers and others who will need to make decisions later as to which inventory to use and why, and if they are going to make modifications or not. I would recommend that this paper is published after revisions.

Thank you for your comments. We have revised the paper based on your suggestion and addressed your comments below, as well as digging a bit deeper into the differences to understand the reasons behind the differences, as suggested.

General comments:

In section 2 each of the emission inventories are presented in a subsection. Please harmonize the descriptions in each of these subsections to cover, which regions are included, why the years were chosen as they were, which gridding/proxies/etc were important for each inventory.

We have harmonized the descriptions, as suggested by the reviewer. Section 2 now covers regions, years, sectors, and gridding proxies for each inventory.

Specifically, in section 2.3 for MEIC, the authors state that information for each Chinese province is included. Is that the same as the 33 sub-regions for REAS? Also there 'fine spatial resolution' is mentioned, can this be more quantitative to be able to compare? Later a 0.25x0.25 degree grid is mentioned, but this isn't even as high res as EDGAR – how does this fit together? How is the gridding for MEIC done?

REAS sub-regions include all the 31 sub-regions that are in the MEIC inventory, as well as Hong Kong and Macau. We have clarified this section by outlining the sub-regions better and we also removed "fine" from the spatial resolution in the MEIC description, as we agree with the reviewer's comment. The section 2.3 now reads as follows:
MEIC is an inventory developed at Tsinghua University, Beijing, China, and provides source sector information for the 31 Chinese sub-regions (all those included in the REAS,

except the two special administrative regions: Hong Kong and Macau) for 2008 and 2010 (Li et al., 2014; Zheng et al., 2014; Li et al., 2015; Liu et al., 2015). The MEIC model has a flexible spatial and sectoral resolution and allows for gridding of the emission product into user-specific grid including 0.25° longitude x 0.25° latitude horizontal resolution, as well as coarser grids. The emissions source sectors provided are power plants, industry, transport, residential and agricultural sources. Important proxy data for gridding of emissions includes population, roads, and power plants.

Furthermore, for the Zhao inventory, why is 2007 used for the disaggregated emissions estimates when data for 2000-2014 are included and EDGAR, REAS, and MEIC provide 2008 data? Or even 2005 which would correspond to GAINS? Why not the whole time series?

Thank you for this suggestion. We have tried to include as much as possible but 2007 was the only year where the data were disaggregated by the source sector. We therefore present the national total values for all species for 2000-2008 and include the disaggregated emissions estimates for 2007. We clarified this by the following text:
A national emissions inventory for the 2000-2008 period was developed at Nanjing University (Zhao et al., 2008) and includes disaggregated information at the source sector and provincial levels for the year 2007.

-In section 3, can the authors address what is behind these estimates? Are some of them based on the same information? Completely different? When emission factors are discussed, is this information that can be included? Activity data, but same EF? More specifically, on L249-255, some of these differences are hinted at, but no more detail is given. How do these mentioned EFs differ for the various sources?

We now compare the net emission factors among EDGAR, REAS, MEIC, and GAINS, as well as the fuel data for the four source sectors and vehicle numbers for a few specific vehicle categories for the road transport sector. It was not possible to obtain information from all inventories and for all sectors as we had liked but we did our best to give as much detail as we possibly could. We have changed the section 3 significantly and a part of 3.1 reads as follows:
"Fig. 2 illustrates China's national total emissions for the four air pollutant species of our interest (CO, SO_2, NOx, and PM_{10}) as well as CO_2 estimated by REAS, EDGAR, MEIC, ZHAO, and GAINS, between 2000 and 2008, along with other published study estimates. We also used one million Monte Carlo samples from all emissions inventories, sector by sector, to create a composite emissions estimates for each species. For the inventories that provided a standard deviation or uncertainty, we used the information and assumed either a normal or log-normal distribution based on the information provided. If such information was not available, we used the relative uncertainty percentage provided by REAS to estimate standard deviation and assumed normal distribution.

We find the largest difference, ranging 65-94 Tg/year (87-106%), between REAS and EDGAR emissions estimates for total CO in China with REAS exceeding EDGAR throughout the 2000-2008 time period (Fig. 2). We further find that the major sectors leading to the differences are industry and transport (Fig. 3). Indeed, between REAS and EDGAR, 38% of the difference in national total CO emissions stems from the industry sector in 2000. By 2008, the industry sector contributes 51% of the difference in their estimates.

What brings such a large difference from the industry sector? Coal combustion plays a large role in CO emissions from this sector in the REAS estimate and 98.6% of the combustible industrial emissions are due to coal in 2008. The comparison of fuel use statistics among REAS, EDGAR, and GAINS for 2000 (Fig. 4) and net emission factors per sector among REAS, EDGAR, GAINS, and MEIC (Fig. 5) are useful in understanding the reason behind the differences. The largest difference in fuel use is found for oil in the industry sector and a more than 9000 PJ/year difference exists between REAS and GAINS inventories. Coal use for industry also shows a more than 6000 PJ/year difference between REAS and GAINS (Fig. 4). However, considering that REAS and EDGAR show the largest difference and not REAS and GAINS for the Industrial CO emissions, it is clear that the difference in emission factors for industrial CO between REAS (2.2 ton CO/TJ) and EDGAR (1.1 ton CO/TJ) is the major reason for this difference, rather than the fuel use. Because emission factors are related to each technology type, penetration of the technology, uncontrolled emission factor and the emission reduction efficiency of each technology type, these factors all contribute to discrepancies. Obtaining estimates for CO is particularly troublesome because of many technology types that exist for emissions reduction. For the transport sector, estimated emissions by EDGAR are still lower than those of REAS (Fig. 3) even with its higher fuel use and emission factor, most likely because the modeling of superemitters have been omitted in EDGAR."

-L359-364: can this text/discussion be elaborated a bit? This is exactly the type of understanding that is missing/typically not communicated in emission inventories and would be a very interesting addition.

Thank you to your suggestion, we have expanded on the fuel use statistics, as illustrated earlier. Now we have new figures (Fig. 4 and 5), and we find that the difference in NOx emissions estimates are due to the difference in emission factors, rather than in fuel use estimates. We include the following paragraph in Section 3.1:
"The power emissions for NOx dominate the national total for REAS, EDGAR, and Zhang et al. (2009) (Fig. 3). 10.9 Tg yr^{-1} (46%) and 10.2 Tg yr^{-1} (51%) of the national NOx emissions are estimated to come from the power sector in REAS and EDGAR, respectively, in 2008. 6.5 Tg yr^{-1} (47%) are estimated to come from the power sector in 2005 for GAINS. Streets et al. (2013) estimated power to be the dominant source sector, contributing 4.4 Tg yr^{-1} (39% of NOx emissions) in 2000, followed by 2.8 Tg yr^{-1} each (equal 25% contribution) from industry and transport. The national emissions inventories, however, do not show dominating power emissions for NOx. For MEIC, industrial emissions are estimated to be slightly higher than those from the power sector. For ZHAO, the two sources are similar in magnitude. 33% (36%) and 35% (35%) of the total emissions equaling 8.6 Tg yr^{-1} (9.4 Tg yr^{-1}) and 8.3 Tg yr^{-1} (7.9 Tg yr^{-1}) are estimated to come from the power (industry) sector in these two national inventories MEIC in 2008

and ZHAO in 2007, respectively. One of the possible reasons for this is due to the difference in emission factors among emission inventories (Fig. 5). MEIC estimates much higher emission factors for NOx emissions from the industry sector than from power, unlike other inventories that estimate the opposite (REAS and GAINS) or fairly close to each other (EDGAR).

-L394-398: 65% vs 38% is a pretty big difference. What is behind this difference? How close are the total amounts of PM10 emissions? Are the differences owing largely to the differences from other countries or the difference attributed to China mainly?

The total amounts of 2008 PM_{10} emissions in China in 2008 in REAS and EDGAR estimates are 21.6 and 15.2 Tg/year, respectively. The total amounts of 2008 PM_{10} emissions in the 22 Asian countries (including China) in 2008 in REAS and EDGAR estimates are 38.3 and 39.3 Tg/year. It is thus clear that although the total regional PM_{10} emissions are quite similar in the two inventories, the estimates for China are not. We now include this in the manuscript as follows:
China's PM_{10} emissions have been increasing rapidly and they contribute approximately 21.6 (15.2) Tg yr^{-1} of 38.3 (39.3) Tg yr^{-1} total PM_{10} emissions from 22 Asian countries, including Afghanistan, Bangladesh, Bhutan, Nepal, Sri Lanka, India, Maldives, Pakistan, South Korea, North Korea, China, Japan, Singapore, Taiwan, Laos, Cambodia, Brunei, Myanmar, Philippines, Thailand, Vietnam, and Indonesia, in the REAS (EDGAR) estimate. There is a large difference between the estimates for China in the two inventories, although the regional total values are similar. Here, we only discuss primary emissions of PM_{10}, emitted directly from anthropogenic sources.

-section 4.1 & L476-477: what is driving these high off-road emissions for CO and NOx in the northwest? yes, the scales are different, but on-road tends to be higher in most other regions.

For CO, on-road emissions estimates are always higher than off-road in the Northwest in the three inventories. However, as we noted in L476-477, off-road NOx emissions are estimated to be higher than on-road in EDGAR, on average, by 57Gg/year in the Northwest. Neither REAS nor ZHAO estimate off-road to be higher in this region. This is because the railway activity assumed in EDGAR by coal and diesel locomotives in the region are much higher than the estimates by REAS and ZHAO. I have expanded this in the text as follows:
For the Northwest, EDGAR estimates larger emissions from off-road compared to on-road for NOx, which we do not see in either REAS or ZHAO. REAS estimates a higher growth rate for off-road emissions and their emissions estimates increase from 28.4 Gg yr^{-1} in 2000 to 75.1 Gg yr^{-1} in 2008, while EDGAR off-road emissions estimates show only a slight increase from 98.5 Gg yr^{-1} to 110 Gg yr^{-1} over the same time period. The large emissions differences are most likely due to much greater railway emissions by coal and diesel locomotives assumed in EDGAR inventory, compared to REAS, in this region.

-section 5: the authors state that they chose 3 of the EI for the model simulations. But 5 were evaluated in the paper. I don't expect model simulations using all the EI, but a justification as to why those 3 were chosen should be added.

We included three that had gridded emissions and we chose one global, one regional, and one national inventories to conduct simulations. These three also provided the maximum national total for most species (REAS), minimum national total for most species (EDGAR), and in between for most species (MEIC), as to provide a range in emissions estimates. We now have the following in the manuscript to justify our reasoning for these three inventories.
"We chose the three emissions inventories that provided gridded emissions and are targeted at different scales: EDGAR at global, REAS at regional, and MEIC at national. In addition, EDGAR estimates the lowest emissions for most species, whereas REAS estimates the highest and thus providing the range of air quality simulation from varying emissions. We then performed model simulations for January and July for 2008, using each of these inventories."

-L534-538 & L553-559: Here the authors compare the modeled to the observed values, and they are not even remotely close. Summer is better than winter, but still. I understand that models often over- or under-predict observed values, but this is a factor of 2 or more different. I also understand that model validation is not the point of this paper and it was more to demonstrate the implications of differences in EI, for which one might argue that the absolute concentration comparison to observed is not so important. However, while the models are described earlier, there are no references to model validation for the region, etc. Could something to at least reference this be included? It would be good to also at least acknowledge or try to explain this underestimation beyond just stating that it exists. Is this likely missing sources in the inventory? Poorly captured processes?

Thank you for this and we realize that we did not explain that this underestimation is mainly due to turning dust off in the model. We conducted a simulation without including dust in order to focus on the differences on air quality due to the different gridded emissions inputs. However, this method has led to a much larger difference in modeled values from the observed values. We have previously validated the model using dust in a paper by Zhong et al. (2015) and we make this clearer in this revised manuscript. The revision reads as follows:
"In order to focus on differences in air quality due to differing anthropogenic emissions estimates of gaseous pollutants and PM, we did not include dust in the model simulations in this study.

The model simulation including dust has been validated with existing measurements for the year 2007 in Zhong et al. (2015) and here we focus on differences in air quality simulation due to differing gridded anthropogenic emissions inputs."

Specific comments:

-There are a number of words that are used incorrectly throughout the manuscript and should be replaced. Please do a search and replace, checking to make sure that the phrasing is still correct as written:

-discrepancy (definition: an illogical or surprising lack of compatibility or similarity between two or more facts) is used when difference would be much more appropriate.

-share; e.g., L333: ‘Nationally, it shares 53, 33,.... of total SO2 emissions in REAS, ...’ The industry sector does not ‘share’ anything. It should be written that SO2 emissions from industry contribute X amount to the national total.

-trends; this is not a language issue, but rather a scientific one. Trends are typically referring to a long time series of data for which a robust trend analysis has been done (e.g., with p-values, and a percent change per year over a minimum time period of 10-15 years or longer calculated). That is not how it is used here. I would suggest to avoid any confusion, that instances of ‘trend’ be replaced with ‘change’ since from what I can tell, it is always a percent change calculated from one year (e.g., 2000) to another year (2008), and that the concentrations of the years in between are not considered in this calculation. If this is not the case and an actual trend is calculated, this should be added to the methods section.

Thank you for these corrections. We have changed our manuscript to make sure that the words we use are correct.

-L144-147: could these points mentioned in the text be added to Figure 3 where the years match to make the comparison easier? Also L173-174/L176?

Since these are the national total estimates and not the sector total, it is not possible for us to include these values in Figure 3. Instead, we created a new national total figure (Fig. 2) and included these values as well.

-L187: The Schwartz et al 1994 reference is fine, but there are papers that would be more appropriate for health impacts of ozone.

Thank you for this suggestion. We agree and we have inserted other papers, including Mudway and Kelly (2000) and Levy et al. (2005), which are more appropriate for health impacts of ozone. The revised manuscript now reads as follows:
“Atmospheric CO is mainly a result of incomplete combustion of fossil fuels and biofuels and exposure to ambient CO is harmful to human health (Aronow and Isbell1973; Stern et al., 1988; Allred et al., 1989; Morris et al., 1995). CO emissions are also important precursors to the formation of tropospheric O_3, which also has harmful human health impacts, including increased asthma exacerbations, decreased pulmonary function, and increased mortality (Schwartz et al., 1994; Mudway and Kelly 2000; Levy et al., 2005).”

-L209-210: This sentence doesn't make sense. The industry sector shares 51% of the difference in the estimates of what? Similarly, L241, '...sharing 43.7% of the difference in 2000 and 34.4% in 2008.' What does this mean? sharing the difference? please clarify.

Sorry for the confusion. We have revised the sentence to read as follows in the manuscript:
"Indeed, between REAS and EDGAR, 38% of the difference in national total CO emissions stems from the industry sector in 2000. By 2008, emissions difference in the industry sector contributes 51% of the total emissions difference for CO emissions in China."
"The third largest CO source and the source sector with the second largest difference after industry is transport, contributing 43.7% (34.4%) of the total difference in 2000 (2008)."

-L320/Table 3: Are these the number of officially registered power plants? Are all officially registered? Is the data source reliable/are these numbers easy to get or is it likely that they are underestimated?

This is based on the power plants listed in the Carbon Monitoring for Action (CARMA) database (http://carma.org/). This is the most transparent and most recent data available in terms of power plants and is used as a proxy for all inventories we compared in this paper. It is possible that they are underestimated but we do not have a better source to compare this number.

-In a number of cases, such as L346, percent changes are listed, but in many cases I think an absolute value change would be helpful because for example, in this case, the overall amount for SO2 emissions from residential sector is not high and this can be pretty misleading then.

We have changed the percentages to absolute values throughout the manuscript, based on the reviewer's suggestion. The sentence now reads as follows:
The residential sector emissions difference in the Southwest between EDGAR and REAS estimates have decreased from 354 Gg/year in 2000 to 215 Gg/year in 2008.

-also L376-377: differences in sector listed as %, but how does this relate to the total?

As mentioned above, we have changed the percentages to the absolute values, based on the reviewer's suggestion. The sentence now reads as:
In the South, Northwest, and Southwest, the difference in the transport sector emissions (percentage) among the inventories can also be as high as 560 (67%), 491 (72%), and 601 (83%) Gg/year, respectively.

-again L479-480, how does this relate to absolute amounts?

Same as above. The revised text reads as follows:

REAS estimates a higher growth rate for off-road emissions and their emissions estimates increase from 28.4 Gg yr^{-1} in 2000 to 75.1 Gg yr^{-1} in 2008, while EDGAR off-road emissions estimates only increase from 98.5 Gg yr^{-1} to 110 Gg yr^{-1} over the same time period.

-L476: very dependent on the absolute values; although 258% seems like a huge amount. Please relate to the total to make it a more informative statement.
Same as above. The current text now reads as follows:
For the East, REAS estimates an increase from 307 Gg/year to 1100 Gg/year in off-road emissions between 2000 and 2008.

-L426-434: in the figure for PM, the REAS inventory shows a number of jumps for some regions. Can these be explained?

The jumps we believe the reviewer indicated are the following:

1. the increase in Southwest from 2001 to 2002
2. the change in Northwest in 2000, 2001 and 2002
3. the increase in South from 2004 to 2005

The first jump is mainly due to the fuelwood consumption in Sichuan province within the Southwest region. The second jump for 2000/2001 is due to the change in fuelwood consumption in Shaanxi province and the change in crop residue consumption in Xinjiang province in 2001/2002 within the Northwest region. The third jump is due to the change in fuelwood and crop residue consumption in Guanxi province between 2004 and 2005 in the South region.

-L443-445: The text does not match the figure. The 'rest of gasoline' is not the majority share of any of the species. Nor is SO2 'non-existent' in REAS.

We are very sorry for the error. We have realized the mistake in the figure and forgot to update the text. Now the revised text reads as follows:
The majority of emissions (85% and 83%) come from gasoline vehicles in REAS and GAINS and almost all (97%) in EDGAR for CO. On the other hand, a significant contribution (67%, 65%, and 75%) comes from diesel vehicles for NOx in REAS, EDGAR, and GAINS, respectively. For PM_{10}, while REAS and GAINS estimates 390 Gg/year and 542 Gg/year, respectively, EDGAR only estimates 48 Gg/year. On-road SO_2 emissions also show a large difference between EDGAR (60 Gg/year) and REAS and GAINS (148 Gg/year and 200 Gg/year).

-L451-454: It seems odd to say we see significant differences in the CO, PM10, and SO2 emissions and then analyze the differences for different species, CO and NOx.

Yes, we agree and we now analyze these all species in more detail now in Section 4.

-why is it that in 4.1 and 4.2 that only 3 of the EI are included now? Justification?

Not all inventories have the information for on-road and off-road available and we compared with the four (we now include GAINS data in addition to REAS, EDGAR, and ZHAO) that we were able to collect. We were unable to obtain information from the MEIC inventory.

-section 5.2: the authors discuss differences in concentration by region throughout this section, it would be good if they could add explicitly what these numbers represent. Are the values monthly average concentrations from all grid cells over the region? Or is it the maximum difference between monthly values for any single grid cell? Please clarify.

Yes, these are monthly average concentrations from all grid cells over the region. Now we have inserted the following to clarify this in the manuscript:
For CO, both simulations using REAS and MEIC result in higher mixing ratios than when using EDGAR. We quantified the regional monthly mean of each simulation by averaging all grid cells in each region, as illustrated in Table 4. The REAS and MEIC regional monthly means are 270-470 ppbv (169-194 ppbv) higher in the polluted area in the Central (the East) region, than the EDGAR simulation. For NO_2, the largest differences in regional monthly mean occur between simulations using EDGAR and MEIC emissions, mainly in the Central (8.1 ppbv), followed by the East (7.2 ppbv) and the Northeast (3.3 ppbv). These regions are where the differences in emissions are the largest as well. For SO_2, both simulations using REAS and MEIC show differences in monthly mean less than 30% in most regions compared to those with EDGAR emissions, except in the Southwest, where REAS and MEIC estimates are 1.5 and 1.7 ppbv higher, respectively, than EDGAR estimates.

-L523-528: absolute amounts would help because the percents and concentration differences listed for CO are so huge, that it is then hard to relate the percents for the other species to concentrations, which are surely not similar to CO. In general, it would be good to mention table 4 which provides many of these concentrations much earlier in the section instead of only in the last 2 sentences.

We have changed the percentage to the absolute differences. We have also made changes to the section, such that Table 4 is mentioned much earlier in the section. The revision to this paragraph was stated as an answer to the previous question.

-L550-551: this statement started out as relevant for NOx-VOC balance because of how these regimes affect ozone concentrations, and ended up as a blanket statement about how EI input is important. While the latter is true, it doesn't add much to the paper. Please avoid this and be more specific in the paper to really address the issue at hand.

Thank you for this suggestion. We have now changed the text to illustrate that constraining NOx and VOC emissions in the Central and East regions are essential for understanding mitigation measures for O_3 in the future. The revised text reads as follows:
This result illustrates the importance of constraining NOx and VOC emissions in the East and Central regions in understanding the way to mitigate O_3 pollution for the future.

-Figure 12b is never referenced or referred to in the text.

We now reference the Figure in the text.

Minor edits:

-there are a number of small typos/english errors. I have specifically mentioned some here, but not all of them. Please try to read through this for such errors.

-L21: correct to '...for finding effective mitigation measures for reducing...'

Corrected. Thank you.

-L25: correct to '...worst air quality countries in the world are located...'

Corrected. Thank you.

-L44-47: here CO, NOx, SO2, and PM are mentioned, but NMVOCs are also mentioned in the abstract and subsequent text. Please add.

We do not conduct an in-depth NMVOCs analysis in this paper, and so we changed the text as following to clarify this point:
The purpose of this study is to analyze the differences among the existing emissions inventory estimates for China's anthropogenic gaseous and aerosol emissions and how they affect air quality simulations. We analyze the emissions of carbon dioxide (CO_2), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs), and particulate matter with an aerodynamic diameter less than 10 um (PM_{10}). We first evaluate the differences among inventories at the national level between years 2000 and 2008 for CO_2, CO, SO_2, NOx, and PM_{10} and produce composite emissions estimates, using Monte Carlo samplings. Second, we focus on four source sectors (industry, transport, power, and residential) in seven regions of China (the East, North, Northeast, Central, Southwest, Northwest and South) for CO, SO_2, NOx, and PM_{10}. Next, we analyze the emissions estimates in the transport sector in more detail. By disaggregating emissions into these source sectors and regions, we aim to understand where the differences occur and how we can better constrain emissions. We also use a chemical transport model, the Weather Research and Forecasting model coupled with Chemistry (WRF-Chem) to assess how the different emissions estimates affect air quality modeling results.

-L83: correct to '...was developed collaboratively between...'

Corrected.

-L84: correct to 'The inventory comprises emissions data from...'

Corrected.

-L191: correct to '...at the national level compared in Fig. 2 to all other species.'

Corrected.

-L199: correct to '...regardless of which inventory. Industry emissions contribute X, X, ... of the national total....'
Corrected.

-L280: add at the end of the sentence: '...in 2008, were emitted from this region.'

Added.

-L313-315: I would suggest to edit as follows: 'Up to this peak, REAS and EDGAR follow similar trajectories, but the SO2 emissions in the Central and the Northwest start to decrease in 2004, in 2005 in the South, East, and North, and in 2006 in the Northeast and the Southwest in REAS.'

Changed.

-L317: define FGD

The FGD is defined as "flue-gas desulphurization" in L. 36.

-L392: suggest to consider using 'patterns' or similar instead of 'trends'

Changed.

-L413: do the authors mean 'reductions in EFs?' or are there reduction factors that are applied to emissions? Would be good to clarify either way.

This refers to the reduction factors that are applied to emissions for certain technologies. Rather than stating "emissions reduction factor" we rephrased it as "removal efficiency of a certain technology" to make it clearer.

-L418: replace 'troublesome' with 'difficult'

Corrected.

-L518: replace 'magnitudes' with 'concentrations' (or mixing ratios)

Corrected.

-Figure 5: there is a typo in REAS in the caption

Corrected.