

Interactive comment on “Three Northern Regions Shelter Forest contributed to long-term increasing trend of biogenic isoprene emissions in Northern China” by Xiaodong Zhang et al.

Anonymous Referee #2

Received and published: 2 March 2016

Zhang et al have made MEGAN model simulations of isoprene emissions in China for the period 1982-2010, with special emphasis on the effects of the massive afforestation currently underway in the Three Northern Regions Shelter Forest (TNRSF) area. Model simulations showed an increase of isoprene fluxes over the years in the areas where forested cover also increased, suggesting that the man-made afforestation played a major role in the change of isoprene emissions.

This paper deals with the impact of human activities on the vegetation cover of a big land area that in turn impacts the concentrations of isoprene, an atmospherically relevant volatile organic compound that participates in the photochemistry of the atmosphere and can have an active role in the pollution episodes that China has been suffer-

C1

ing in recent years. Thus this paper is within the scope of ACP and I would recommend its publication after addressing some concerns. The text needs some rewriting to make it clearer to the reader, especially the part reporting the TVOC measurements and the modeling of fluxes from those measurements.

Specific comments:

P2L2: correct the number “R2=0014”, there must be a decimal point missing.

P2L10: defining reactive BVOCs emitted by plants as “harmful gases” is not appropriate. Authors can argue that they have implications for atmospheric generation of pollutants such as ozone, but not that these gases are harmful.

P6L19: Reference to Guenther et al 2006, is it correct? If the MEGAN version was 2.1, should this reference be Guenther et al 2012? Otherwise, MEGAN version should be 2.0.

P9L1: Should L (oxidation rate) be replaced with C (isoprene concentration) in the text? Table S3 does not list L but C, and it is reasonable that L will actually vary with OH and O₃ concentrations, which are also listed in this list.

P10L7: Please write the genus name *Populus* starting with capital letter. Was it only one species of poplars that were planted in the region? If so, please give the scientific name, otherwise list as *Populus* spp and refer to this trees in plural in the text.

P10L10: Please list the variety of *P. sylvestris* or otherwise remove the word “var”.

P13L13: The slope of -0.534 applies to northern China without including the TNRSF, according to Fig S5. Please clarify in the text.

P14L14: Did the authors do any statistical analysis to support the statement that the trends of isoprene emissions in the Central-North region are statistically significant whereas those from the other two regions are not?

P17L8-P18L2: Please clarify this part of the text. If the surface of a model grid square

C2

is not completely covered by vegetation, wouldn't this imply that the calculated MEGAN fluxes do not compare so nicely with the estimates using Eq (1), mainly because the MEGAN fluxes calculated for these sites where TVOC measurements were performed would be higher (more vegetation coverage than the model grid square)?

P18L14: was vehicular exhaust the dominant source of atmospheric isoprene? Do the authors want to say that vehicular exhaust was the dominant source of atmospheric VOCs? Same for line 17 of this page.

P19L15: Correct Arneiths to Arneith.

P20L10-13: Please clarify this sentence.

P22L1: This sentence needs more information to make sense. As it currently reads, it may seem that 2007 was a bad year for the trees, but looking at Fig. 2, isoprene emissions are at or near the historical maximum. I suspect the authors have something else in mind that is not clear to me. What is the time span that the authors describe as showing a "considerable decline of forest coverage and isoprene emissions"?

P22L7-8: the authors assume steady state of the mixed forest of Northeast China, regarding which variable? LAI? If so, have the authors checked whether the LAI information on Fig S6 agree with this assumption?

P27L10: Please list the year of publication (1996) and the complete list of authors.

FigS6 (caption): LAT should be LAI?

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2015-944, 2016.