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 #3

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Long term trend of isoprene emission in the Three Northern Regions Shelter Forest (TNRSF) from 1982 to 2010 was evaluated, using a biogenic emission model for gases and aerosols (MEGAN). Isoprene emission flux has increased substantially in many places in the TNRSF due to the increase of trees and vegetation coverage, especially in the Central-North China region. The estimated isoprene emissions suggest that the TNRSF has altered the long-term emission trend in North China. I recommend its publication after addressing some questions. Please see the questions and comments bellow:

Specific comments:

P2L10: they also emit harmful gases into the air. By our understanding, these gases

are not harmful, please correct it, or cite references here. P6L12: MEGAN2.1 is primarily driven by biological and meteorological factors, including vegetation type with which the emission factors of BVOCs are assigned, air and leaf temperatures, light, leaf age and leaf area index (LAI), and soil moisture. Please introduce these data sources in the calculation for past three decades, the uncertainties of all these parameters used in the model for TNRSF, for example PAR, emission factor. P9L6: What are the sampling numbers at 8 sites in a field campaign? More introductions should be given for the measurements, such as VOC species and concentrations. P12L10: It's better to use mg m-2h-1 instead of micro-moles m-2 hr-1. P14L17 (and P22L14): These natural forests already reached the steady state, is there any evidence from botanical field? P15L13: No direct measurements of BVOCs emission data across the TNRSF have been ever reported before. This sentence should be corrected. Some measurements of BVOC emissions and concentrations in TNRSF region had been carried out, for example: Klinger L.F., Li Q.J., Guenther A. et al. 2002. Assessment of volatile organic compound emissions from ecosystems of China, J. Geophy. Res., 107(D21). Wang Z.H., Bai Y.H., Zhang S.Y., 2003. A biogenic volatile organic compounds emission inventory for Beijing. Atmospheric Environment. 37, 3771-3782. Bai J.H., Baker B., Liang B.S., Greenberg J., Guenther A., 2006. Isoprene and monoterpene emissions from an Inner Mongolia grassland. Atmospheric Environment. 40(30), 5753-5758. There should be more others that can be used for the evaluation.

P19L12: The increasing biogenic isoprene emissions can be attributed to the development of the TNRSF (i.e., LAI), how about the roles of other factors, PAR, temperature. My suggestion is to consider these parameters in all analysis, including P24L3. Where are figures Fig. S6a and b? P24L16: emission minus dry deposition? please make it clear.

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