

## ***Interactive comment on “Spatial and temporal variation of anthropogenic black carbon emissions in China for the period 1980–2009” by Y. Qin and S. D. Xie***

**Anonymous Referee #2**

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The authors developed an anthropogenic BC emission inventory in China for the period 1980–2009. The BC emission inventory is essential and important data for atmospheric science community and policymaker in the field of PM pollution as well as climate change due to the SLCF. The topic certainly is suitable for ACP. The manuscript presents the spatial and temporal variations for BC emissions in China, the comparison with other inventories, and uncertainty analysis. The author's inventory has some advantages in the targeted period covering the 30 years (1980–2009) and in the input data (time-varying emission factors, local emission factors for domestic sector, and others). However, the originality and new findings of the manuscript is much less compared to recent publication of ACP (Lu et al., 2011). From this point, the manuscript needs to

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be improved in the following aspects at least to be qualified science paper in ACP: (1) demonstrating clearly the scientific advance of the improvement of emission inventory due to the methodology and input data used in the work; (2) adding the more discussion of the comparison with bottom-up inventories (especially, Lu et al., 2011) and the top-down inventories (especially, Fu et al., 2011) the implication of their differences. In conclusion, I am recommending the major revision of this manuscript in the following points.

<References> Lu et al.: Sulfur dioxide and primary carbonaceous aerosol emissions in China and India, 1996–2010, ACP, 11, 9839–9864, 2011. Fu et al.: Carbonaceous aerosols in China: top-down constraints on primary sources and estimation of secondary contribution, ACPD, 11, 28219–28272, 2011.

(Major comments) (1) One of the advantages of the author's work is the using of time-varying emission factors for vehicles, industry, and power generation. However, the emission factors for industry and power generation are assumed based on the percentage of control devices and the removal efficiency in 1995 and 2020 from Streets et al. (2001). This is just a rough assumption; hence the authors should evaluate and demonstrate the validity and/or the limitation of the assumption. Additionally, the authors should demonstrate the temporal variations of vehicle emission factors used in this work (page 32882, lines 20–24).

(2) Lu et al. (2011) presented the historical BC emissions in China for the period 1996–2010. Also, Fu et al. (2011) estimated BC emissions in China for 2006 by top-down constraints. It is recommended that the authors should compare to the emissions estimated by these works and discuss about the implication of their differences.

(Minor comments) (1) Eq. (1): Is the subscript “m” of EF correct? If so, the authors should explain how to estimate the EF by province.

(2) Line 11, page 32882: Why is the navigation excluded?

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(3) Line 17, age 32885: The references are inconsistent with those in the footnote of Table 14.

(4) Lines 7-8 and 25-26, page 32886: The authors need to explain how to extrapolate to the period 1980-1994.

(5) Table 3: In the title of table, "for different biomass types for open burning in China" is better for clarification of "open burning" or "biofuel".

(6) Figures: All figures are not clear. They need to be improved.

(7) Figs. 2 and 3: The figures showing the time evolution of emission amount as well as the relative contribution will give the useful information in the manuscript.

(8) Figs. 4 and 7: The size of these figures is too small to be visible. These should be improved.

(9) Figs. 5 and 6: A unit of emissions should be specified.

(10) Fig. 8: The continuous data of Ohara et al. (2007) are provided on the web site of <http://www.jamstec.go.jp/frcgc/research/p3/emission.htm>.

(11) Fig. 9: It is difficult to distinguish the blue lines showing 2.5%, Median, Mean, and 97.5% from the blue bar of emission uncertainty. Additionally, the horizontal axis label should be added.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 32877, 2011.