This manuscript developed the emission inventory in Chinese mainland for 12 dioxin-like UP-PCBs congeners from 66 sources with a resolution of 0.1°×0.1°from 1960 to 2019. The characteristics of geospatial and temporal variations in total, per capita emissions and emission intensities were also investigated. This UP-PCBs emissions provides an essential data support for the assessment of human health risks from exposure to PCBs and for policy-makers to optimize PCBs mitigation strategies, and key input data for environmental modeling of PCBs. In general, the paper is well written, although some places require modification and clarification. It can be published after minor revisions.

Specific comments
1. This study established emissions inventories of 12 dioxin-like UP-PCBs for various sources by using the economic activities and corresponding EFs. But the EFs listed in Table S1 are total EFs for the sum of 12 dioxin-like UP-PCBs. How can obtain the EF for each UP-PCB from various sources? The detail EFs for individual dioxin-like UP-PCB should be presented.

2. In the Section 2.3, for other sources, gridded industrial coal consumption from PKU-FUEL was used as surrogate. This surrogate data for spatial allocation is not appropriate for some emission sources. I suggest gridded field fire data can be used to allocate the emissions from open biomass source. The surrogate data for waste incineration should use the spatial distribution of incinerator in different provinces.

3. Line 148, Fig. 3 shows UP-PCBs emission profiles for 9 source categories in Chinese mainland. But Fig. 3 shows the emission profiles for 12 dioxin-like UP-PCBs. The results (line 152-155) for emission profiles for 12 UP-PCBs from various sources also can not be seen from Fig. 3. The authors should add one figure to show the 12 UP-PCBs emission profiles for 9 source categories.

4. Line 214-215, Cement production was the 215 major contributor across Chinese mainland from 1960 to 2019, followed by waste burning and industry boilers sector. This result and be seen from Fig. 4A, not Fig. S5.

5. The spatial resolution of Fig. 2 should be given.

6. Line 50, H. et al., 2004? Please check it.

7. Line 105. "Total population" should be gridded population density, and the data source should be given.

8. The representative meaning of σ in eq. 1 should be given.

9. The year should be given in Fig.2 and Fig. 3.

10. The unit of y-axis in Fig. S5 should be given.