Point by point response to the reviewer #2:

First of all, we would like to thank the reviewers for the positive and constructive comments. The line number below is indicated based on the clean version. The followings are response to the questions of reviewer #2.

Comments from the reviewer:

-Reviewer 2

General comments: In this manuscript, a 24-year long-term observation of atmospheric CH_4 at Waliguan WMO/GAW global station in the Tibetan Plateau was studied. This report is very meaningful and the analysis of the paper is very comprehensive. The CH_4 variations and its related potential causes during the long-term observation have been analyzed in details, which would help the scientific community to understand carbon cycle and formulate more informed carbon reduction policy. Given the importance and value of the long-term measurements of CH_4 in the Tibetan Plateau plus that this manuscript is well drafted, I would recommend accepting this paper after minor modifications listed as below.

Response: Thank you very much for your positive comments. We revised the manuscript and answered the questions point by point.

Specific comments:

Line 98: add 'About' before 90%.

Response: We have added it (Line 82).

Line 233-238: How frequent is the backward trajectory computed? Hourly? Please specify the numbers of trajectories are determined.

Response: Yes, it's hourly. We computed the 3-day back trajectories coincident with hourly CH_4 mole fractions. The number of trajectories was determined by the valid hourly CH_4 observations. We added the descriptions (Line 229-230). The related information, e.g. numbers, and average mole fractions, was listed in Table 3.

Some expression is not professional, e.g. “long-distance transport” (Lines 465), can be expressed by “long-range transport”, and so on. Please polish the whole report.

Response: Thank you for your suggestion. We have revised all the descriptions in the manuscript.

There are several places in results and discussion where too many details are given, which make the text a little difficult to follow. Results and discussion are suggested to be merged.

Response: Thank you very much for your constructive suggestion. We merged ‘Results’ and ‘Discussion’ and rewrote the Chapter. The interpretation/conclusion was described in conjunction with results.

Lines 685-686: Suggest to give more discussions about the larger growth rates in the Tibetan Plateau than that of city region.

Response: We rewrote the Chapter 3.7. The interpretation/conclusion was described in conjunction with results. More discussions were added (Line 685-702).

“These results suggested that there were possibly other strong CH_4 sources at the WLG that were not from cities and the southwest region (Northern India) was the most likely contributor. The PSCF analysis also supported this result (Fig .7). At present, Northern India and Eastern China were the two largest sources of CH_4 at the WLG (Fig. S10) (Crippa et al., 2019). Since the Tibetan Plateau was coincidently trapped in the middle of them, the atmospheric CH_4 at WLG was very likely dominated by long-range transport from these two regions. Although CH_4 emissions increased slowly during 1994-2002, a negative trend appeared (Fig. S10), significantly increased emissions were found in both southeast and southwest Asia after 2007. Chen et al. (2013) illustrated that the warming (0.2 °C per decade) in the Tibetan Plateau resulted in substantial emissions of CH_4 due to the thawed permafrost and melted glaciers. The rapid increase of CH_4 would probably make it difficult to meet the goals of carbon emission reduction in the future. This would

be especially true with the scenario of quickly increasing CH_4 on the Qinghai-Tibetan Plateau due to the emissions from the two largest source regions of Northern India and Eastern China. The large growth rate of atmospheric CH_4 in the TP revealed that i) the atmospheric CH_4 at the WLG was not predominantly influenced by eastern cities in recent years and ii) large amounts of CH_4 were transported from the Tibetan Plateau to WLG in recent years."

Line 1057: delete 'CO'.

Response: We are sorry for the mistake. The average CO mole fractions were added in Table 3.

Why are the points not on the line in figure 8 and 9?

Response: Thank you for your question. The lines are the smoothed curves of the points using the method of 'LOESS' Curve Fitting (Local Polynomial Regression), hence they do not just connect the points.