The manuscripts value is very significant because it measures the levels of mercury speciation in the atmosphere in an important new high elevation location in a dominant global source region. The analysis also attempts to evaluate the most significant source areas for transported mercury events. The organization of the manuscript and overall scientific content and analysis is good. I recommend that the manuscript be published after the following main issues are resolved and other minor recommendations considered.

Main Issues (see detail below)

- Sampling bias caused by the use of 25 foot heated line in front of the manual Hg sampling system for RGM and PHg
- Limitations and uncertainties associated with the PSCF model and results
- No observation or discussion of the potential impact of elevated free-troposphere RGM
- Limit or temper speculative conclusions that are lacking strong evidence
- Fix typos and grammatical errors

General Comments

Multiple grammatical and typos were observed. There are too many to document them all (estimate >30). Please have a proof-reader fix these errors. For example:

- Northern India instead of northern India
- Mace Head instead of mace Head
- Cape Point instead of cape Point
- filter instead of filer
- Keeler instead of keeler
- ….**the** denuder was sealed…

Consider using TGM, GEM, (Gaseous Elemental Mercury), GOM (Gaseous Oxidized Mercury) and PBM (Particle Bound Mercury) for your nomenclature throughout the document. This is the nomenclature now being used by the GMOS and AMNet monitoring networks.

Specific Comments

ABSTRACT

- Define first use of WLG as Waliguan

- Line 18: I believe the use of "direct evidence" is overstated. The use of the term "direct evidence" must be supported by a unique chemical signature, for example Hg/CO, aerosol trace metals or organic compound ratios for the source location, in addition to mercury measurements coupled with meteorological models. I recommend changing the sentence starting on line 16 to read *"Moreover, we found that Northern India may be a significant source region for WLG during the sampling campaign, and this is the first published evidence suggesting long-range transport of atmospheric Hg from India to the Northeastern Tibetan Plateau.*

PAGE 30555

Lines 12-16. Recommend that this sentence is clarified, since there is no consensus or clear research results that define the source of mercury re-emission. It cannot be clearly classified as anthropogenic or natural in most cases.

Lines 23-24. Fix typo in references

Section 1.3

- GEM sampling: Was the filter located at the inlet to the heated line or at the location of the Tekran? It is important to distinguish, since particles and dust can collect in the sample line and create mercury artifacts.
- What is the abbreviation LT?
- The biggest concern for the entire study was the use of a 25 ft heated Teflon tube upstream of the manual inlet-denuder-filter system. This modification does not follow the method of Landis et al., (2005) as stated. Significant amounts of PHg and especially RGM will be absorbed to the 25 feet of Teflon tubing, causing a variable low bias. In the paper by Landis et al., (2005) they emphasize the importance of the inlet system by stating the following *"The glass elutriator/acceleration jet has an extremely short residence time and is cross-linked Teflon-coated to minimize the loss of RGM."* Furthermore, Landis et al., (2005) go on to discuss the challenges of transporting RGM in their laboratory manifold with the special Teflon coating because RGM is "sticky", which emphasizes the requirement for a short inlet. For this study, the RGM wall-loss bias through the 25 feet of Teflon tubing should be clearly stated in this section. Also the RGM and PHg sampling bias must be disclosed when discussing the summary air concentration results in several tables and the interpretation of the PSCF analysis. For example, the RGM sampling bias may be responsible for the observation of "stable levels" of RGM with no high events, which contrasts sharply with the PHg and TGM observations.
- Please list the temperature of the 25 ft heated Telfon tube used for RGM and PHg sampling.
- Please list the field blank mean and standard deviation for the denuders.

Section 1.4

- There should be a discussion of the limitations for PSCF in this study because of the complex terrain and limited meteorological data in this region. How sensitive is the model to the arbitrarily set criterion for Hg concentrations?

Section 2.1

- Recommend changing the format of Figure 3 to a bar graph with the width of the bar equal to the sample time. This would more accurately represent the data, since there are large gaps in a single day where no sample was collected.

Section 2.2

- Since this is a GAW site, it is a little disappointing not to see any comparisons of the mercury concentrations and wind direction with other tracers of pollution, such as CO, carbon soot, fine fraction aerosol or other measured compounds. For example, if continuous CO data is available, does it have the same wind-rose shape as TGM?
- There is no discussion or consideration of the effects of upslope/downslope meteorology on the behavior of RGM at this extremely high elevation mountain site? Please discuss the potential impact on the observations at WLG due to the known high concentrations of RGM in the free-troposphere, observed by multiple research groups as referenced in the manuscript (Murphy, Swartzendruber, Faïn) and recent work by Sheu at the Taiwan high elevation site. In section 2.6, the authors mention that vertical air flow movement reverses during the night, which results in downward transport of the free-troposphere air. If free-troposphere RGM does not influence WLG observations, please explain with respect to the local meteorology for different seasons.

Section 2.3

- The paragraph starting on page 30065, line 22 should be re-evaluated and adjusted to be less speculative and over-reaching. For example, comparing the seriousness of Hg pollution levels in two countries based on land-area is too simplistic and speculative.

Section 2.4

- The analysis in this section relies on and explanation for the RGM results due to its short lifetime and to some extent the limitations of the PSCF model with limited RGM data. Please bring into the discussion the likely RGM sampling artifact mentioned above and the role (or not) of high RGM in the free troposphere as possible explanations for the PSCF results for RGM.

Section 2.6

- Does Figure 10 include the entire TGM data set? Please clarify.
- There appears to be several contradictory lines of reasoning in this section. Implicating quiescent nighttime conditions and nearby local settlements for the largest, most rapid jump in TGM concentrations (to their highest average level) just prior to sunrise seems to contradict the notion of long-range transport and the PSCF results. Also, the fact that this site acts opposite to other high elevation sites, as the authors highlight, is difficult to reconcile. The complex local meteorology and potential impacts of local sources (even the site itself) seem more complicated and deserve a more rigorous review and explanation for the reader. The diurnal pattern for TGM does not make sense for a remote site far from sources, considering TGM is a compound with a lifetime of months.
- Consider removing the graph and discussion about the diurnal trend for PHg and RGM. Not enough continuous data was generated to make this analysis meaningful.

Conclusions

- The entire conclusion, especially the last paragraph should reflect all modifications made in the manuscript based on changes requested or recommended by the reviewers.