

## ***Interactive comment on “Airborne hydrogen cyanide measurements using a chemical ionisation mass spectrometer for the plume identification of biomass burning forest fires” by M. Le Breton et al.***

**Anonymous Referee #2**

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Review of ACP – Airborne hydrogen cyanide measurements using a CIMS for the plume identification of biomass burning forest fires

This is a concise manuscript that presents a new method for measuring HCN and a method for identifying biomass burning plumes. I think the paper should be revised to improve the presentation of the data and to allow readers to draw conclusions on the applicability of the method.

1) Detection limits – what is the LOD for the instrument for HCN for the 3 s average

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analysis time. How was the background level determined and what was the variability of the background signal?

2) Flight tracks and altitude profiles – Only six flights were analyzed in this paper. I think a figure showing the flight tracks and the location of fires would be very helpful. Also some information about altitude would be very helpful.

3) NEMR vs ER – The measurement of the excess mixing ratios is fine for identifying biomass plumes. However, these don't necessarily translate to emissions ratios from fires. For example, the plumes may be from multiple fires of different ages and characteristics. In addition, a plume could be mixed with an urban source of CO etc. So using the measured NEMR and translating this to a fire emission ratio has some issues. This is probably the reason that the measured emission ratios are thought to be a little low. In addition, translating the ER derived in this work to a global average is a stretch as other types of fires will give different answers. This needs to be discussed to at least acknowledge these issues and more importantly to frame the modeling effort as an exercise in credibility as opposed to a derivation of a global HCN budget.

4) 6 Sigma Method – I think the 6 sigma method for HCN is probably a fine way of identifying plumes and it may be the best for this mission. However, different conditions and different measurements may necessitate using other methods or datasets such as acetonitrile. So I think stating this is a method for identifying biomass plumes is OK but I don't think much beyond that can be set in preference to other methods. Instead I think an example of how this picks out a biomass plume from the data would be more useful i.e. show the data for HCN, CO, etc in time and highlight what the 6 sigma method says is the plume. I also think that the background and deviation for each flight for HCN should be reported as well.

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