

Interactive comment on “Smoke injection heights from fires in North America: analysis of 5 years of satellite observations” by M. Val Martin et al.

Anonymous Referee #1

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This paper presents a detailed analysis of plume heights observed in North America. The authors use the MISR product and a tool (MINX) to obtain estimates of the plume heights. The study is very detailed and provides interesting information about the statistics related to fires and plume dispersion. The drawback of using MISR measurements is that the maximum fire activity in the late afternoon is generally missed. The authors are well aware of this shortcoming and mention this several times in the manuscript.

Another shortcoming, that is mentioned less frequent, is the fact that pyrocumulus formation is excluded from the analysis (stereo-analysis of MISR data is not possible). This is relevant, since the condensation of water vapour leads to extra lift of the plume (buoyancy). One would expect that cases of pyrocumulus formation would lead to

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significantly higher plumes. The authors should mention this more clearly in the final paper in my opinion. Another issue is the fact that only the vertical temperature profile (stable layers) from the GEOS model are used in the analysis. A good test would be to compare the GEOS winds to the winds observed from the plume dispersion. And I wonder if, apart from stable layers, wind shear may play a role in the plume rise.

Another personal comment is the fact that the paper is rather lengthy. Why should readers be interested in statistics for the mean, median, maximum, mode, and individual heights? I understand that you perform the analysis for all these plume height definitions, but the story and the main conclusions do not change if only one or two of these definitions are presented. The authors may consider slimming down the paper on this aspect.

A last point: the authors are not very clear how these data can be used by modellers. The main conclusion, however, is that this is an excellent paper that presents interesting results.

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