

Interactive comment on “Impacts of the Denver Cyclone on Regional Air Quality and Aerosol Formation in the Colorado Front Range during FRAPPÉ 2014” by K. T. Vu et al.

Anonymous Referee #1

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The discussion paper describes measurements of gas phase and aerosol species over Colorado, and relates them to the Denver Cyclone. In general the measurements and analysis are good and well-described. The clarity of the presentation could be improved in several ways before final publication.

General comments:

1. The abstract is extremely detailed and dense. Are all the numbers necessary? A number of abbreviations are used, which should not be necessary in an abstract.
2. The overall hypothesis and conclusion of the paper seems to be that the Denver Cyclone contributes to aerosol concentrations in the Denver metro area primarily by

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transporting aerosol and/or aerosol precursors from the northern Front Range. This should be made much more clear in the abstract, introduction, and conclusions.

3. Relative humidity is used throughout the paper. I understand that RH is very important for aerosol properties, but it has a number of drawbacks as a meteorological variable. A conserved humidity variable such as specific humidity or mixing ratio is more appropriate. RH varies strongly with height in a well-mixed boundary layer because the temperature varies, while potential temperature and mixing ratio may be more or less constant with height. RH can only be compared at the same temperature. For example, check section 3.5.

4. The argument about relative increases in CO vs. ethane seems incorrect (section 3.3.1, last paragraph). CO has a small percentage increase because it has a large background, while ethane has no background. The correct comparison would be made by removing the CO background. The conclusion may not change. This propagates through to section 3.4, which should be checked for consistency.

Specific comments:

1. p.8, lines 27-30: The spatial contrast and separation are present but not "stark".
2. p.15, line 2: Again, "isolation" is too strong.
3. p.15, line 16: "Dramatically" is probably too strong. Can you make a quantitative estimate here?

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