

Interactive comment on “Transport of Pollution to a Remote Coastal Site during Gap Flow from California’s Interior: Impacts on Aerosol Composition, Clouds and Radiative Balance” by A. C. Martin et al.

Anonymous Referee #2

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The manuscript by Martin et al. describes the transport and secondary aging of particulate pollutants observed at a remote coastal site during channeled flow through a prominent gap from the California’s Central Valley. The Petaluma Gap Flow (PGF) events were identified from local pollution and background conditions using meteorological and gas-phase measurements. Physicochemical properties of aerosol particles are reported for different air mass origins. Further, implications on aerosol indirect effects are discussed based on measurements and modeling work. In general, I found this study was conducted carefully and the paper is informative. I would recommend publication in ACP once the authors address the specific comments below.

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Specific comments

1. Although the authors have provided a brief introduction for the phenomenon of PGF and also referenced in a previous paper (Neiman et al., 2006), it would be nice if they could also provide a map. The map may show the terrain of the Northern California region (and the prominent gap), the site location, and a diagram of the PGF to help the readers to understand the PGF without reading the reference.
2. This paper used many acronyms and abbreviations. I would suggest including a table with abbreviations for efficient reading.
3. Related to the comment above, please choose a different abbreviation for marine aerosol than the “SSA” (sea salt aerosol?), because “SSA” can also represent Single-Scattering Albedo in the aerosol and cloud community.
4. Section 2.3: Specify the size range for the APS. What are the typical RH values in the sampling line? Does the RH sufficiently low such that the size measurements were not affected?
5. Section 2.5: I was confused about whether the CCN measurements were conducted for super-saturation scan or diameter scan. Please specify.
6. Section 3.2, Page 6 Line 25: Say explicitly what correction is needed for the aethalometer. Correction for back scattering?
7. Section 4.2: Report the “all-study mean” values, and the percentage differences of mean values between the PGF and CTL periods.
8. Fig. 2: Do the colors in the wind rose plots represent the binned wind speed, as stated in the legend, or a relative probability, as stated in the caption? Also, use SI unit m s^{-1} instead of kts?
9. Fig.2 vs. Fig. 4: Fig. 4 shows that the mean value of APS particle number concentration was about one order of magnitude lower during the PGF than that during the

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CTL (2.4 cm⁻³ vs 14.9 cm⁻³, as mentioned in Page 10, Line 27). However, their median values were very similar, as shown in Fig. 2a. Please provide some explanation.

10. Section 4.4: I found the normalization of ratios not intuitive. Add an equation in the main text, or in an appendix.

11. Section 4.4: Any explanation for the association between high OC:soot ratio and high abundance of amines-type particles (Fig. 8a)? Do the OC ions usually nitrogen containing for the CLT cases?

12. Fig. 10: I found this figure is confusing and less informative. As the values have been mentioned in the text, this figure can be eliminated. The corresponding method section (section 3.5) could be significantly shortened.

Technical comments

1. Page 5, Line 2: Please check the symbol (κ ?).

2. Page 7, Line 20: missing "." after "radiative effects"

3. Page 7 Line 24: Extra "." after "particle aging"

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-454, 2016.