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Interactive comment

Interactive comment on "Long-range transport patterns into the tropical northwest Pacific during the CAMP^{2}Ex aircraft campaign: chemical composition, size distributions, and the impact of convection" *by* Miguel Ricardo A. Hilario et al.

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Response: We thank the two reviewers for their thoughtful suggestions and constructive criticism that have helped us improve our manuscript. Below we provide responses to reviewer concerns and suggestions. A major change to note at the outset is that we are re-submitting the paper as a Measurement Report to alleviate concerns about the lack of novelty and/or scientific implications.

RC1:

Printer-friendly version

Discussion paper

Major Comments:

This paper covers airmass origin and aerosol composition in support of the CAMP2Ex campaign in Southeast Asia. The methods are sound and the paper is very well written indeed. While the location for the measurements is an area that has not received much attention over the years, I find this paper somewhat lacking in that it only presents results without any scientific implications to speak of. Specifically, I would regard none of the conclusions listed (a change in synoptic transport with monsoon onset, changes in emissions with geographic region and evidence of scavenging) to be particularly novel from a scientific perspective when presented on their own. As such, I do not find this paper publishable in its current form; I recommend that it should either: 1) be reclassified as a 'measurement report' or 2) Present new findings relevant to current atmospheric science in the discussion and conclusions.

Response: We emphasize that the current paper sets the stage for future papers on topics such as new particle formation, transport-related secondary formation, and 3-dimensional scavenging effects. This paper serves as a valuable reference for transport patterns across the equatorial Pacific during a highly dynamic time of year (i.e., sampling both southwesterly biomass burning and northerly urban emissions), highlighting the potential variability of air mass origin in this region. Given the limited aircraft-based studies on transport patterns in this region, we maintain that this paper provides a much-needed characterization of this highly complex and climate-sensitive region. To satisfy this reviewer's concern, we are submitting this paper as a "Measurement Report".

Minor Comments:

Besides this fundamental issue, I could only find very minor points as follows. Section 2.1: Please give information on the inlet system used for the aerosol instruments.

Response: We have provided the requested information in Section 2.1. The added text reads:

“All in-situ aerosol measurements were placed downstream of a forward-facing shrouded solid diffuser inlet designed by the University of Hawaii that efficiently transmits particles ($\leq 5.0\ \mu$m aerodynamic diameter) to cabin-mounted instrumentation (McNaughton et al., 2007). The inlet flow rate is manually controlled to provide isokinetic sampling over the full range of P-3B airspeeds to minimize size-dependent biasing of the ambient particle size distribution. Downstream of the inlet, flow is split to individual instruments using a custom-designed stainless-steel manifold (Brechtel Manufacturing Inc.).”

Line 121: What elevation data is the Google API using? USGS?

Response: Over the US, the USGS National Elevation Dataset (NED) is the dominant source of Google’s API, with some additional higher resolution lidar data when available. However, over the western Pacific, Google is not entirely transparent about the exact source of its elevation data, which seems to be proprietary. We note that as the Google elevation data is freely available, direct comparisons with other studies are quite possible. Furthermore, any uncertainty in elevation is mitigated by the fact that a large percentage of vertical profiles in this study were done over water, thus any errors in the elevation would minimally affect results. As a result, we felt the best course was to not revise any existing text about this issue in the draft.

Line 136: Where does the uncertainty of 10% come from? Authors should also specify the calibrant used for the SP2, as this differs between groups.

Response: We have added a description of the uncertainty quantification and SP2 calibration in Section 2.1. The added text reads:

“Black carbon (BC; ng m-3) was measured with a Single-Particle Soot Photometer (SP2) (Moteki & Kondo, 2007, 2010), including an uncertainty of 15% based on laboratory intercomparison results from Slowik et al. (2007). Lower detection limits are less than 10 ng m-3 based on manufacturer specifications and confirmed by in-flight filter-blank measurements and observations in the clean tropical free troposphere.

SP2 mass concentration calibration is accomplished using monodisperse nebulized fullerene soot aerosol according to Gysel et al. (2011).”

Line 155: Presumably the NCEP reanalysis was used. If so, it should be specified as such.

Response: We added “reanalysis” to make this clearer.

Section 3.2: Not enough detail is given regarding the motivation and approach taken to perform the sensitivity analysis. This needs expanding on.

Response: We have expanded on the motivation and approach and described an example in greater detail for added clarification:

“Due to the complex nature of long-range transport and the limited resolution of the meteorological input data, there is inherent uncertainty in the generated trajectories. In order to assess the effect of this uncertainty on our results, we evaluated the effect of modifying the following variables on our source-region distribution: (1) trajectory height threshold over source regions; (2) back trajectory run time; (3) vertical profile filtering; (4) monsoon phase; and (5) aircraft sampling location. For example, to test the sensitivity of our results to trajectory height threshold (i.e., 2 km over source regions), we varied this threshold (e.g., 0.5, 1, 3 km over source regions), reclassified trajectories according to the new threshold, and compared the new source-region distribution to the original result, which was presented in Section 3.1.”

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