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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long term in-situ observations of biomass burning aerosol at a high altitude station in Venezuela – sources, impacts and inter annual variability" *by* T. Hamburger et al.

Anonymous Referee #2

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This paper presents long term observations of South American aerosols measured at Pico Espejo Atmospheric Research Station located at 4765 m asl. The measured aerosol parameters are particle number size distribution, size-dependent non-volatile particle number concentration and aerosol absorption coefficient. Data is clearly presented, and the instrumentation is adequately described.

Major Comments:

1. Several papers have shown that New Particle Formation (NPF) is prevalent at high elevations, and strongly associated with the diurnal cycle. Here are examples:

Venzac, H., Sellegri, K., Laj, P., Villani, P., Bonasoni, P., Marinoni, A., Cristofanelli, P., Calzolari, F., Fuzzi, S., Decesari, S., Facchini, M.-C., Vuillermoz, E., and Verza, G. P.: High, Frequency New Particle Formation in the Himalayas, PNAS, 105(41), 15666–15671, 2008.

Hallar, A.G., D. H. Lowenthal, G. Chirokova. C. Wiedinmyer, R.D. Borys, 2011: Persistent Daily New Particle Formation at a Mountain-Top Location, Atmospheric Environment, doi:10.1016/j.atmosenv.2011.04.044.

This work does not consider the potential influence of NPF on the aerosol concentration. It appears that diurnal change in aerosol concentration was connected directly to the BL, yet NPF may play a major role here. Were the size distributions plotted as contours to look for "banana plots"?

From Schmeissner et al., 2011, Figure 6a, it appears that NPF may be occurring at this site. This should be explored further, as biomass burning may not be the sole aerosol source.

2. The statement in section 2.2 on line 3 is an oversimplification. Several papers have observed dust at high altitude stations in remote locations. Here are a few examples:

Holben, B.N. D. et al., 2001, An emerging ground based aerosol climatology: Aerosol Optical Depth from AERONET, J. Geophys. Res., 106, D11, 12,067-12097.

VanCuren, R.A., Cliff, S.S., Perry, K.D., Jimenez-Cruz, M., 2005: Asian continental aerosol persistence above the marine boundary layer over the eastern North Pacific: Continuous aerosol measurements from Intercontinental Transport and Chemical Transformation 2002 (ITCT 2K2). J. Geophys. Res. 110, D09S90 .

Fischer et al., (2009) A decade of dust: Asian dust and springtime aerosol load in the U.S. Pacific Northwest, Geophysical Res. Letter, 36.

VanCuren, R. A., and T. A. Cahill (2002), Asian aerosols in North America: Frequency and concentration of fine dust, J. Geophys. Res., 107(D24), 4804,

doi:10.1029/2002JD002204.

Hallar, A.G., G. Chirokova, I.B. McCubbin, T.H. Painter, C. Wiedinmyer, C. Dodson, 2011: Atmospheric Bioaerosols Transported Via Dust Storms in Western United States, Geophysical Res. Letters, 38, L17801, doi:10.1029/2011GL048166.

3. More detail is required regarding the cloud detection algorithm.

4. Using local daylight time to define the lower free troposphere from the boundary layer is an over simplification. This is highlighted in section 3.3 and Figure 2, where you state an observation of 80% RH in the lower free troposphere. This definition then leads to the unsupported conclusion that soot is mixed into the lower free troposphere.

Minor Comments:

1. Throughout the introduction, there are many citation incorrectly listed as the sole source, for example the first sentence of the manuscript. Please add e.g. before these.

2. More detail should be presented regarding the transmission efficiency of the aerosol inlet. What is the 50% size cut off?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 13079, 2013.