

### Answer to Reviewer # 3

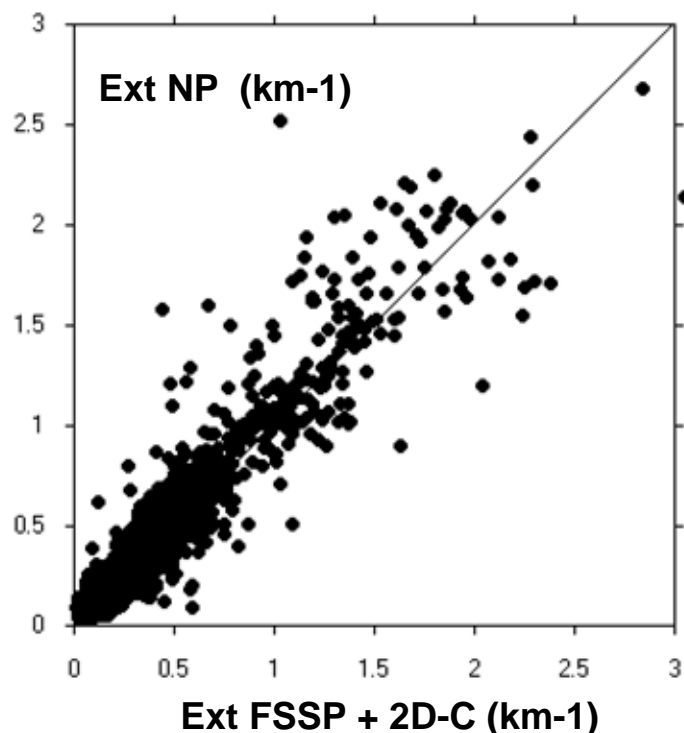
The authors are very grateful to the reviewer for his pertinent and helpful comments on the paper and the time and care he has put into his review. The paper has been modified according to the suggestions proposed. The remainder is devoted to the specific response of the reviewer's comments.

Major comments :

- The abstract has been re-written completely and the large part of motivation for this paper is better explained. See the revised version of the manuscript.

- We use the updraft velocity and humidity measurements in chapter 4 (Discussion) in order to characterize the cloud region where the 22° Halo does occur preferentially. It should be noticed that unfortunately the humidity measurements are not reliable during the case A flight sequence.

- The FSSP – 300 size distribution starts at 3 microns because this lower diameter size threshold gives the best agreement when comparing extinction coefficient derived from the Polar Nephelometer and from the FSSP-300 ( $d > 3 \mu\text{m}$ ) + 2D-C (see figure below). In other words the optical properties (in the visible) are governed by particle larger than  $3 \mu\text{m}$ .



- The calculations for spherical particles are useful to show that the ice particles are definitively NOT spherical.

- In Fig. 2a the size distributions have a gap from 20-30 microns because the particle concentration is low ( $0.3 \text{ l}^{-1}$  for  $d > 100 \mu\text{m}$ ) and the first channels of the 2D-C (and CPI) are not reliable when the probe are used at high airspeed (200 m/s with the Falcon). Following Lawson et al. (2009) as the sensitivity of the probe to small particles decreases with airspeed, particles smaller than about  $100 \mu\text{m}$  may not be detectable at Falcon airspeed (i.e.  $\sim 200 \text{ m s}^{-1}$ ).

*Lawson P.R., E. Jensen, D.L. Mitchell, B. Baker, Q. Mo and B. Pilson: Microphysical and radiative properties of tropical clouds investigated in TC4 and NAMMA, J. Geophys. Res., 115, doi:10.1029/2009JD013017, 2010.*

- A summary of results has been added in the revised version of the manuscript (section 5).

- The authors are very grateful for the language comments and corrections given by the reviewer.