Answer to Interactive comment received and published on September 26th 2011 on "Detection of particles layers in backscatter profiles: application to Antarctic lidar measurements" by J. Gazeaux et al.

We first would like to thank the author who made these comments. They are meaningfull, and allow us to make the submitted paper clearer.

1) Figure 1: ..PSC between 16 and 24 km: : : ist stated, but I see the cloud between 20 and 21 km

We corrected the legend of the figure, the actual PSC layer lays between 19.8km and 21.7km.

2) Figure 2: I would like to see the curve (red line) in lower right corner plot also in the large plot (bottom) so that one can compare the two red lines (slopes). This is not possible at the moment. So, it is not possible to contrast inside-PSC and outside-PSC curves to see how sensitive the detection method has to be to detect PSC.

We think that there is no need to plot both panel with the same width. The red line correspond to equation $y = x$ in every figures. The main role of these three figure is to check whether or not the stationnarized signal can be considered as gaussian separately in every interval (i.e. inside and outside the PSC layer). More particularly the bottom panel shows that, inside and outside the PSC layer, the signal can be considered as gaussian, but this figure does not aim to compared the behaviour of both interval of the signal. We choose to draw the "outisde layer" figure bigger than the "inside layer" figure because there are more points available, and then the "inside layer" figure do not require a big figure.

3) Figure 3: The dotted lines (upper right corner) are dashed horizontal lines! A bit confusing.

Figure 3 has been modified as proposed.

4) Figure 8: y-axis text and numbers are bad: : : I would prefer: just one line of text (one big expression: Altitude, km : : : (one time for all four plots), only at the left side). And at each plot four numbers 10 15 20 25 (but turn the numbers by 90 degree).

Figure 8 has also been modified as proposed.

J.Gazeaux.
02/11/2011

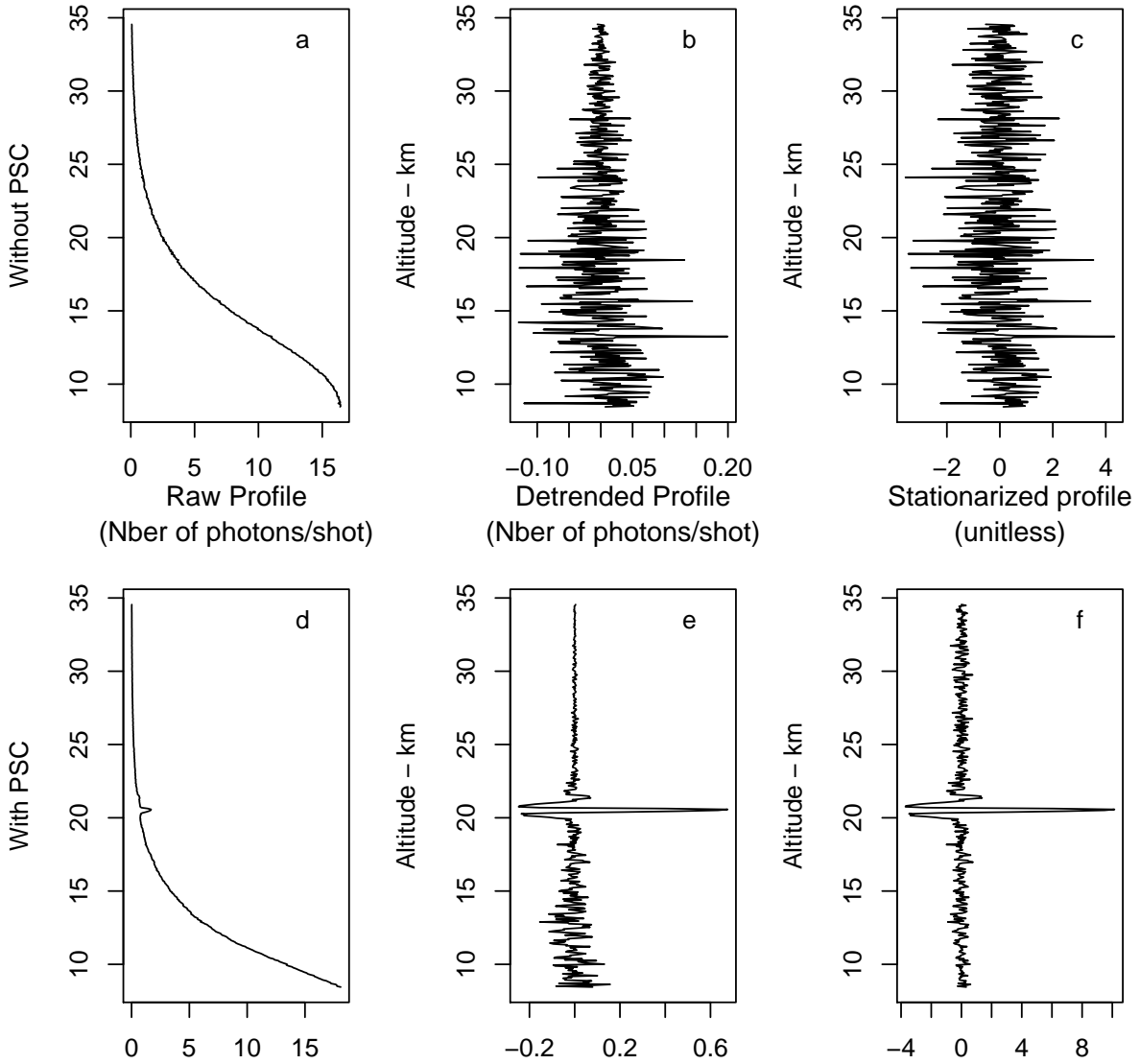The modified figures are presented in the following pages.

Figure 1: Our stationarisation procedure. The three plots on the top correspond to the different steps of stationarisation for a clear sky profile monitored on 2008/04/17, while the three plots on the bottom illustrate the procedure for a profile monitored on 2008/08/23 and displaying a PSC between 19.8km and 21.7km. Note that the scales of the panels are different.
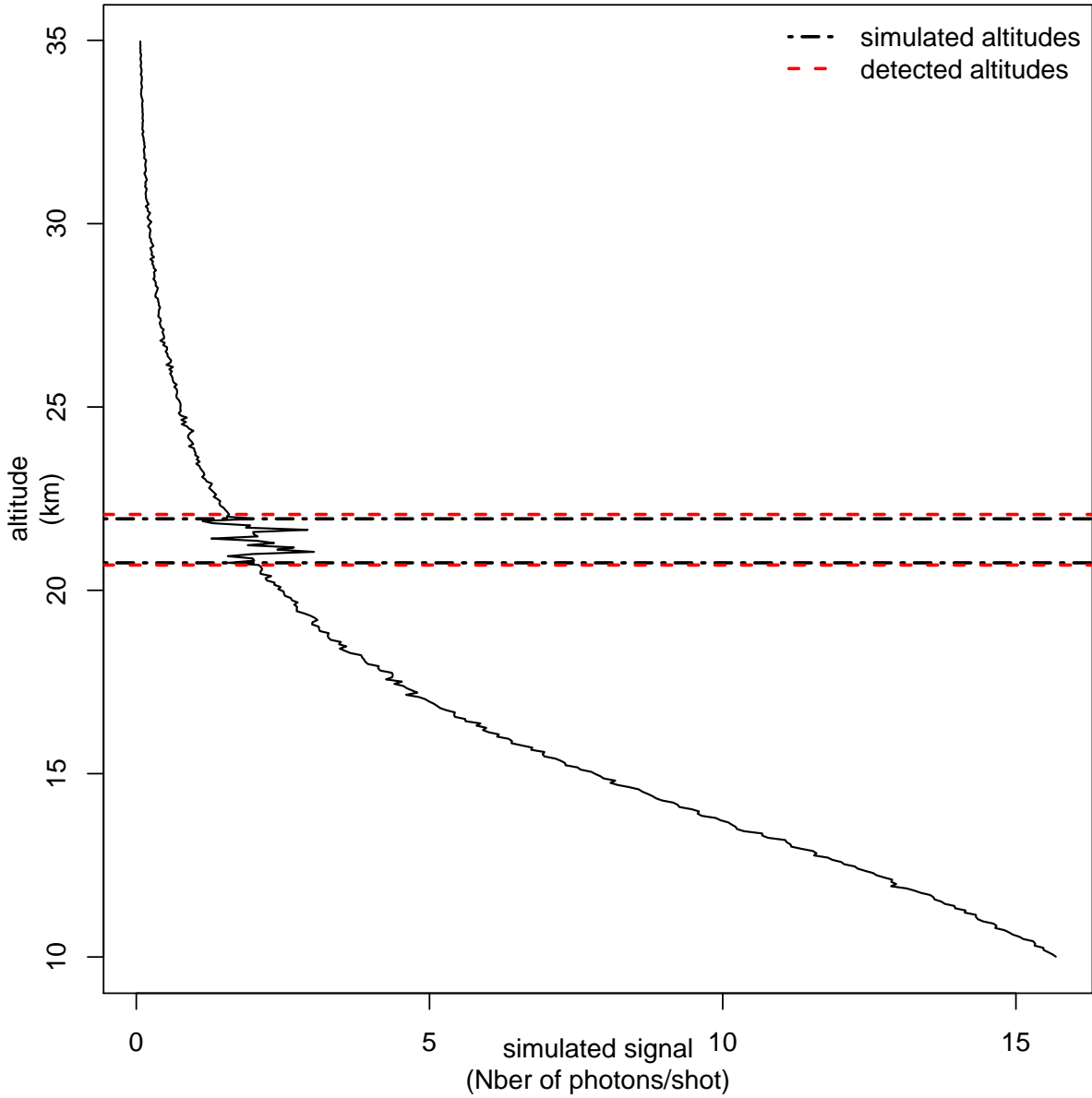
Figure 2: Detection of a PSC in a simulated backscatter profile (black line). The cloud bottom $\hat{\tau}_b$ and top $\hat{\tau}_t$ altitude estimated by the detection algorithm are indicated with the dotted lines; the actual cloud altitude range, as simulated in the profile, are indicated with the black dashed lines.
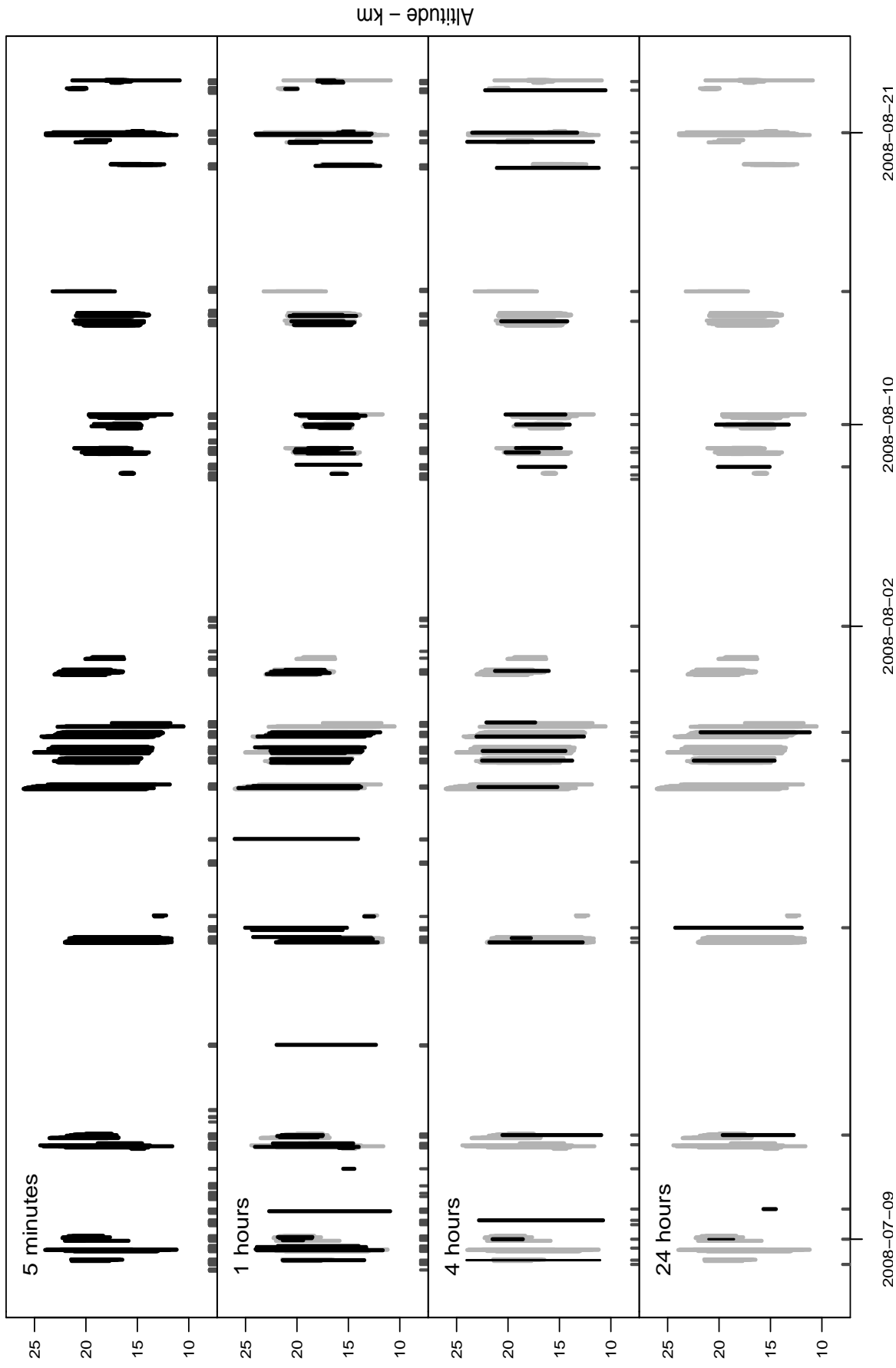
Figure 3: Altitude range of PSC layers detected as a function of time, between June and September 2008. Each panel corresponds to PSC detections carried out over different averaging intervals: 10 mn, 30 mn, 1 hr, 2 hr, 4 hr, 6 hr, 12 hr and 24 hr. The 5 mn interval detections (the first top panel) that are indicated in grey on every other panels. The dots at the bottom of each panel indicate the average profiles processed by the algorithm. The larger the averaging interval is, the smaller the number of data (average profiles) is, the sparser the dots are.

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