Supplemental Material

5

H (m)	LWP/LWP$_{ad}$	
	LWP > 100 g/m^2	50<LWP<100 g/m^2
200-300	-	1.0 ±0.2
300-400	1.1±0.2	0.8±0.2
400-500	0.9±0.2	0.6±0.2
500-600	0.8±0.3	0.3±0.1
600-700	0.6±0.2	0.2± 0.1
700-800	0.5±0.2	-

Table S1: Adiabaticity of sampled clouds and geometrical thickness (H)

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	$\dfrac{\partial \hat{h}}{\partial t}$	$\boldsymbol{v} \cdot \boldsymbol{\nabla} \hat{h}$	ω_s	ω_e
Jan	1.5±2.7	-0.7±2.5	-3.4 ± 2.2	4.1 ± 4.2
Feb	1.2±3.2	-1.4±2.2	-3.4 ± 1.9	3.2± 4.4
Mar	0.9±3.5	-0.8±2.2	-3.6 ± 2.0	3.7 ± 4.6
Apr	0.1±3.4	-0.9±2.2	-3.2 ± 1.9	2.4 ± 4.6
May	0.1±3.8	-1.0±2.4	-3.5 ± 1.9	2.6 ± 4.9
Jun	0.4±3.6	-0.8±2.1	-2.8 ± 1.8	2.5 ± 4.4
Jul	0.2±3.2	-0.7±1.9	-2.2 ± 1.7	1.7 ± 4.0
Aug	0.4±3.5	-1.3±2.1	-2.7 ± 1.8	1.8 ± 4.4
Sep	0.4±3.7	-1.1±2.3	-3.5 ± 1.9	2.7 ± 4.8
Oct	0.7±3.4	-1.1±2.2	-3.5 ± 1.9	3.1 ± 4.6
Nov	0.7±3.4	-1.2±2.2	-3.4 ± 2.0	2.9 ± 4.5
Dec	0.4±3.5	-1.4±2.3	-3.2 ± 1.9	2.2 ± 4.7

Table S2: Monthly averages and standard deviation of the components of the mass budget in (3). All values are reported here in mm s^{-1}.

2017/03/16
2017/03/17
2018/08/05
2018/09/04
2019/03/31
2019/04/04
2019/06/04
2019/06/08
2019/06/25
2019/06/26

Table S3: List of cases used in Section 5.

85
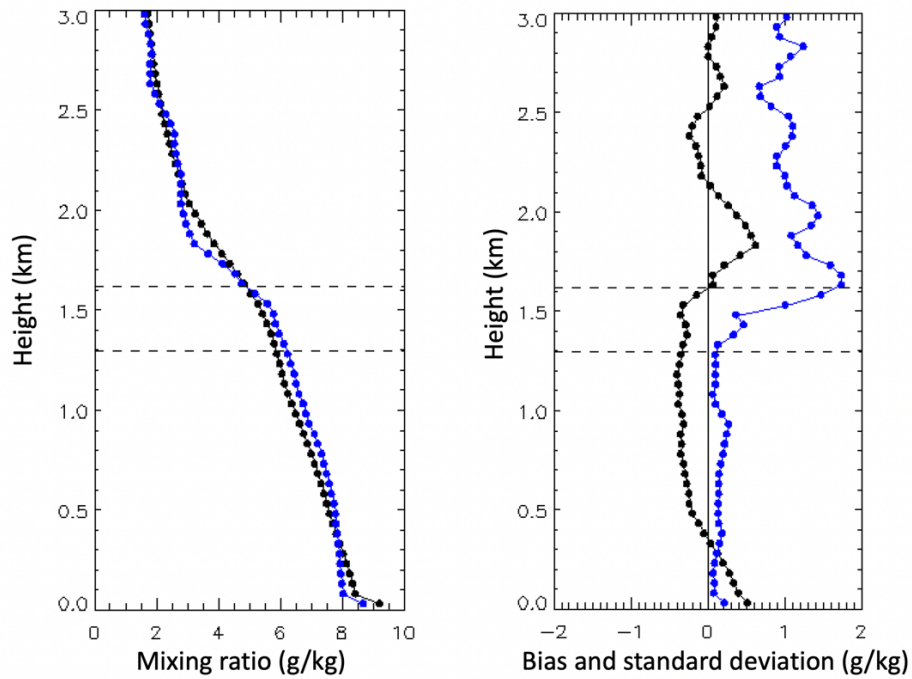
Figure S1: Average profile of mixing ratio from radiosondes (blue) and Raman lidar (black). (b) Bias (black) and
90   **standard deviation (blue) of the differences between retrieved and radiosondes mixing ratio. The horizontal dashed lines indicate average cloud base and cloud top during the selected cases.**