

Vertical Structure and Character of Precipitation in the Tropical High Andes of Bolivia and Southern Peru



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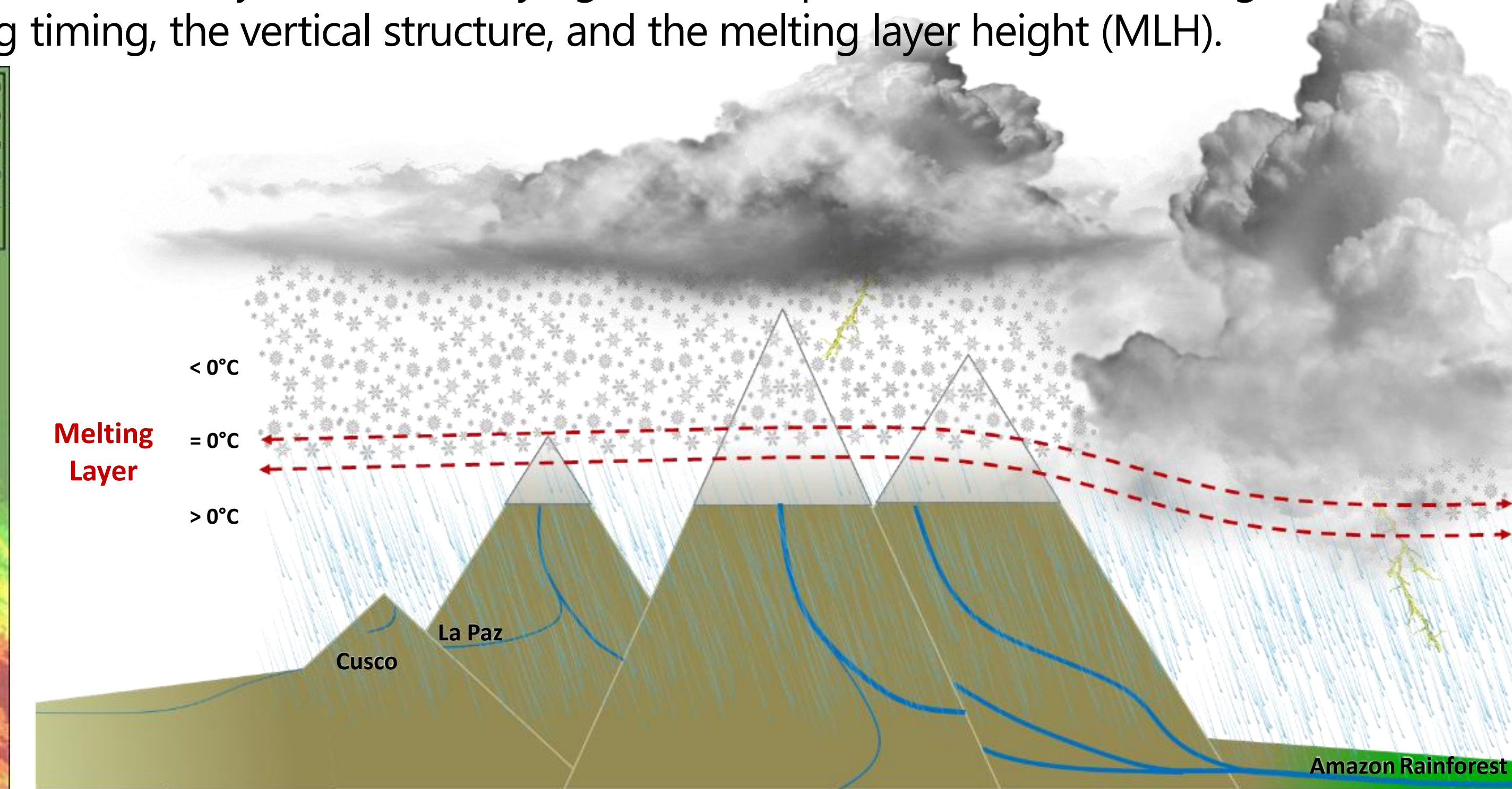
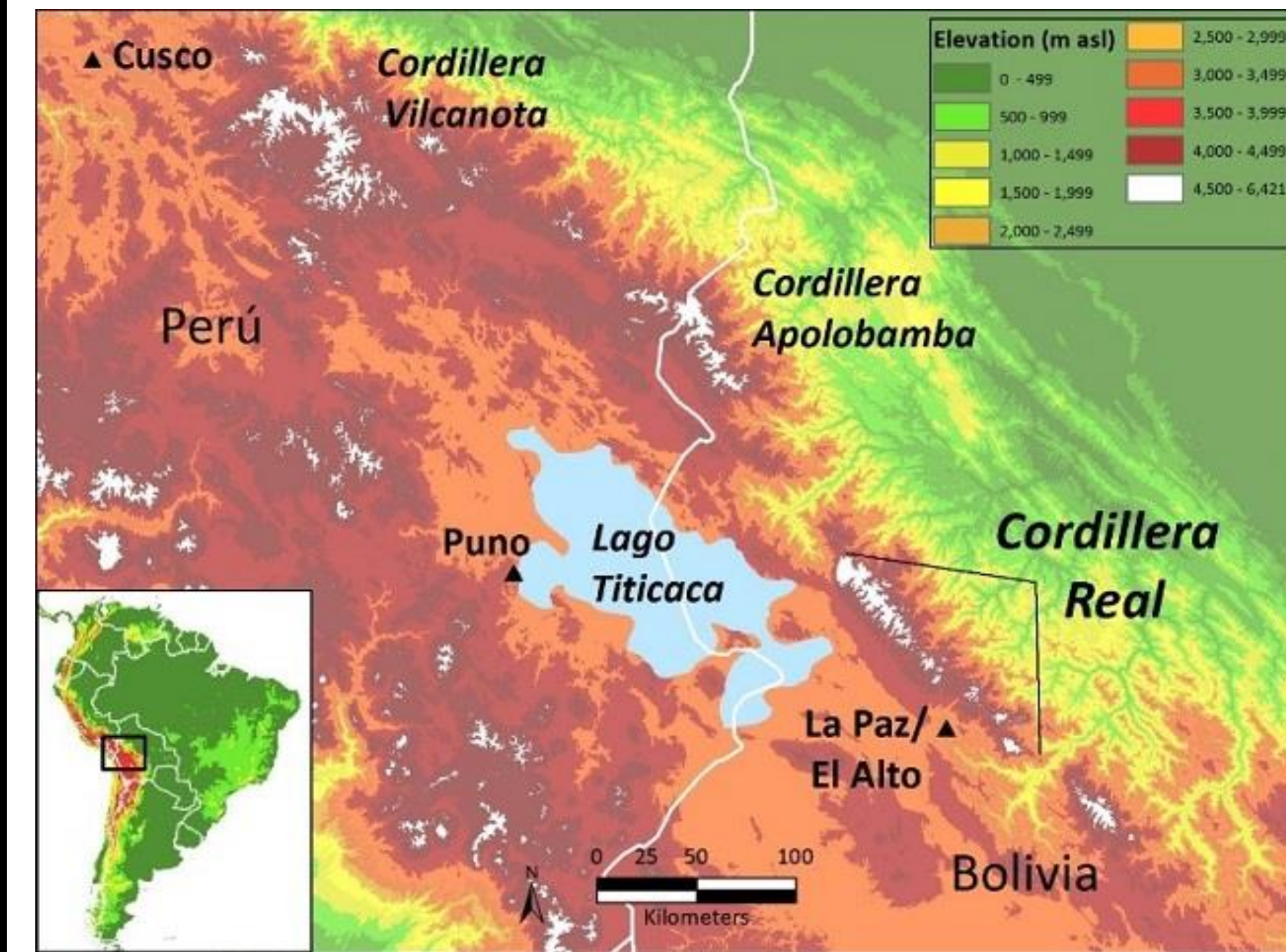
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Introduction

The tropical Andes of southern Peru and western Bolivia contain thousands of glaciers, all hanging in a balance between ablation (melting and/or evaporation) and accumulation. These glaciers not only serve as a freshwater source for communities in the area, but also contain paleoclimate records dating back thousands of years. This study's goal is to improve the understanding of the precipitation that influences these glaciers, including timing, the vertical structure, and the melting layer height (MLH).

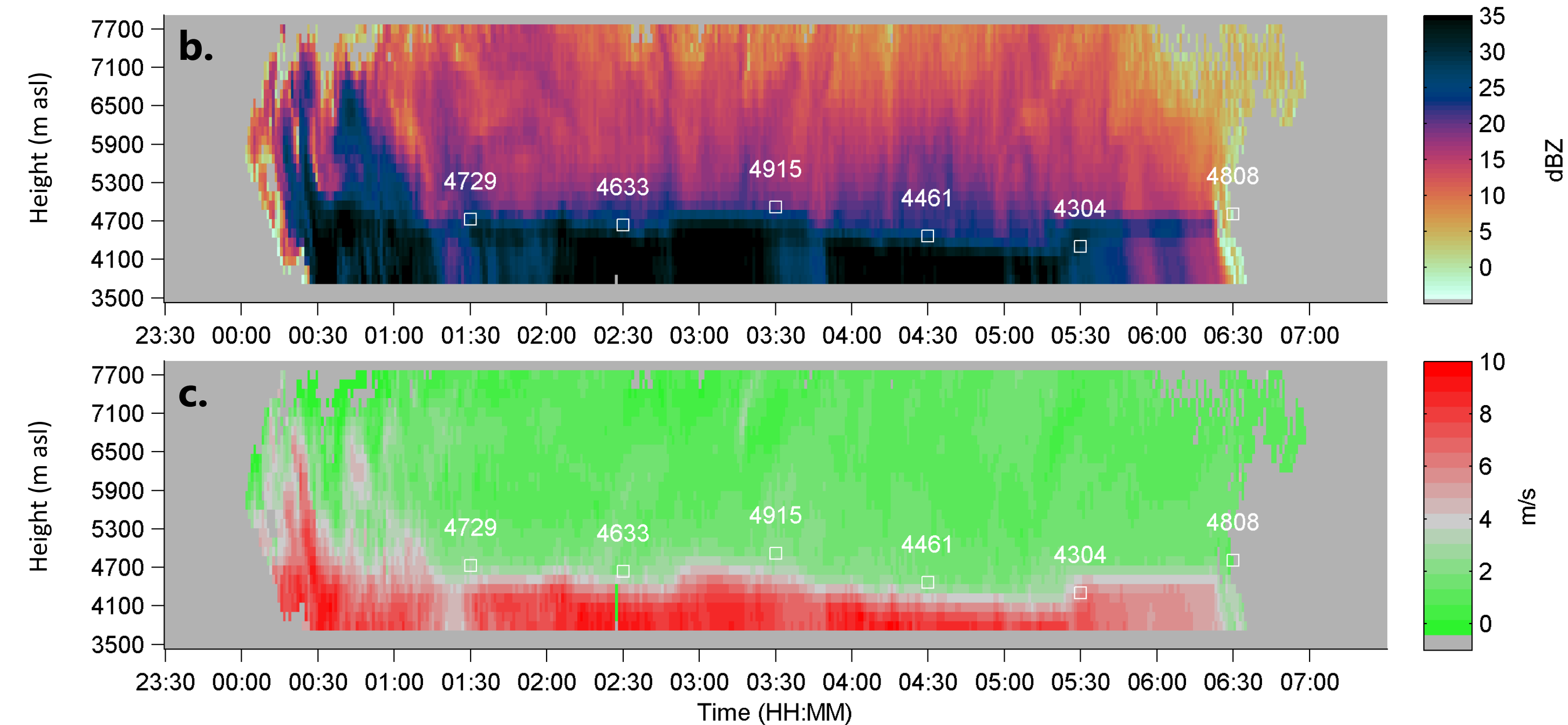
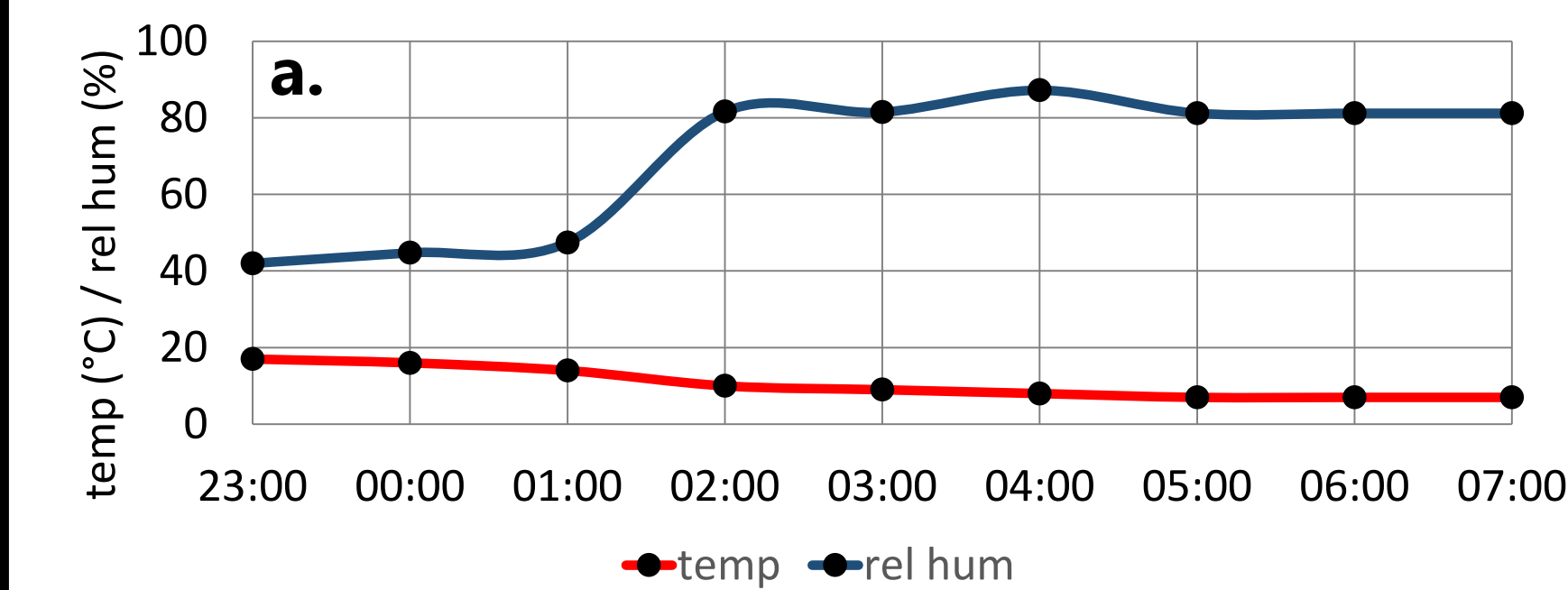


Case Studies

a) temperature/relative humidity plots and vertical profiles of b) reflectivity and c) fall speed from Micro Rain Radar, with annotations of MLH in meters above sea level (m asl).

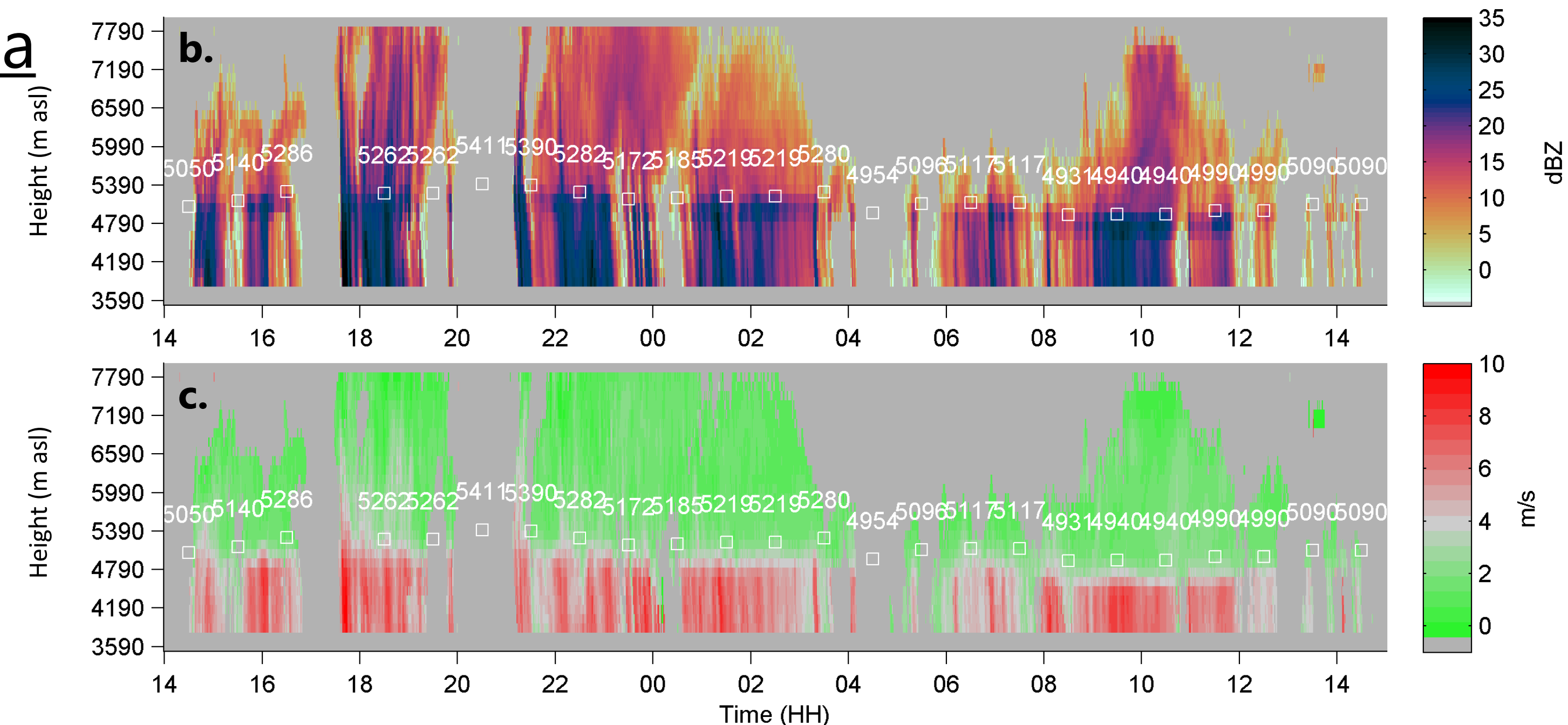
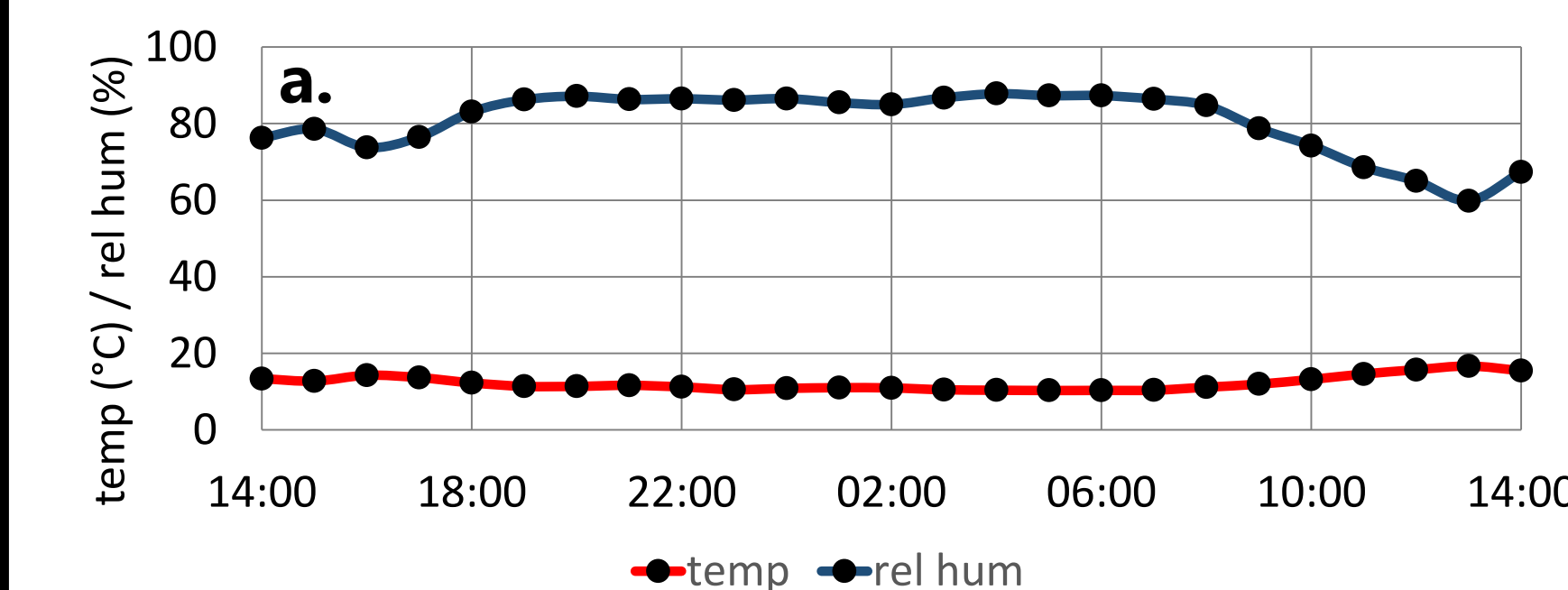
08 October 2014; Cusco, Peru

Total Precip (mm)	Average Temp (°C)	Maximum Reflectivity (dBZ)	Mean Column Reflectivity (dBZ)	Median MLH (m asl)
16.6	9.4	42	22	4681

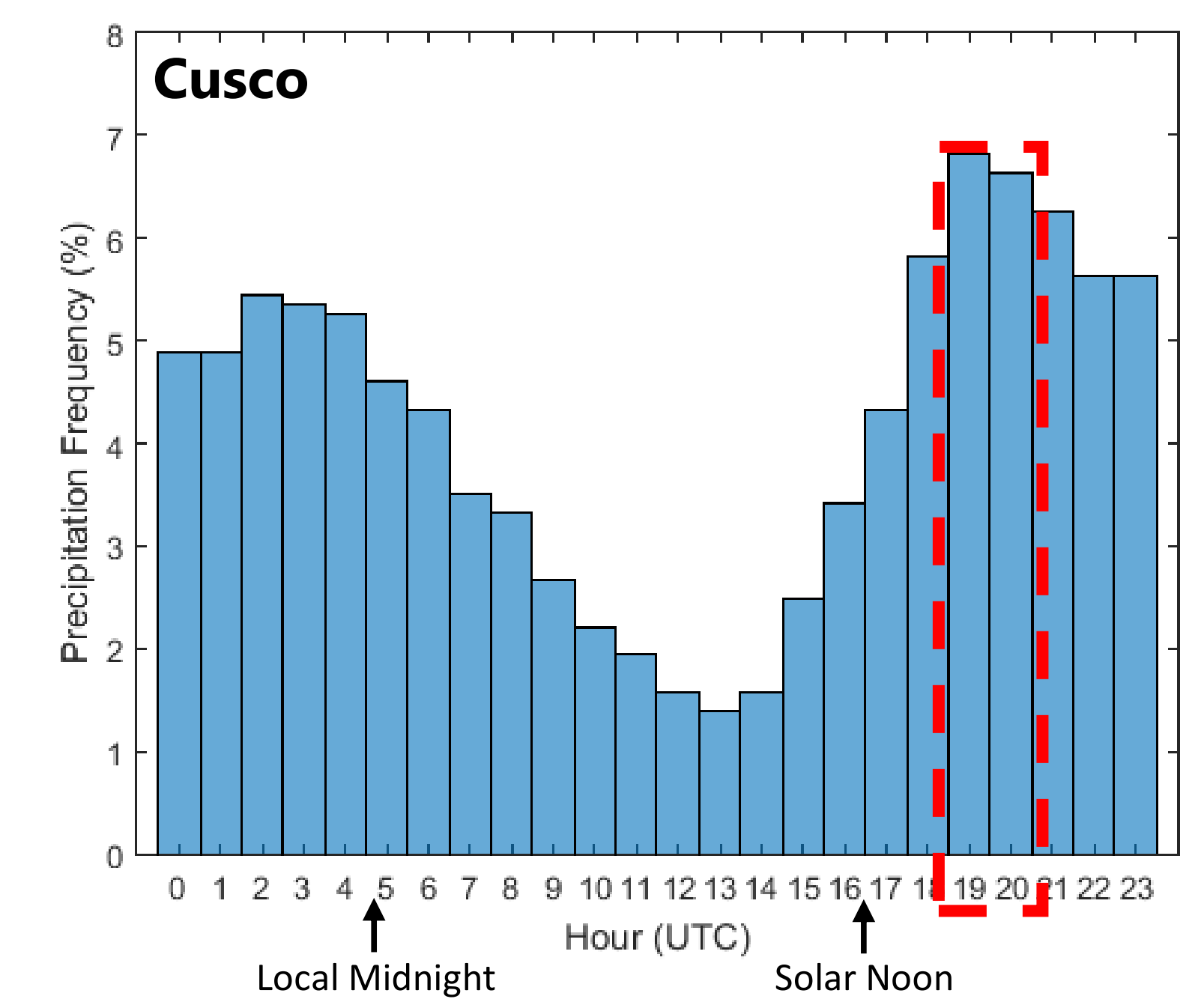
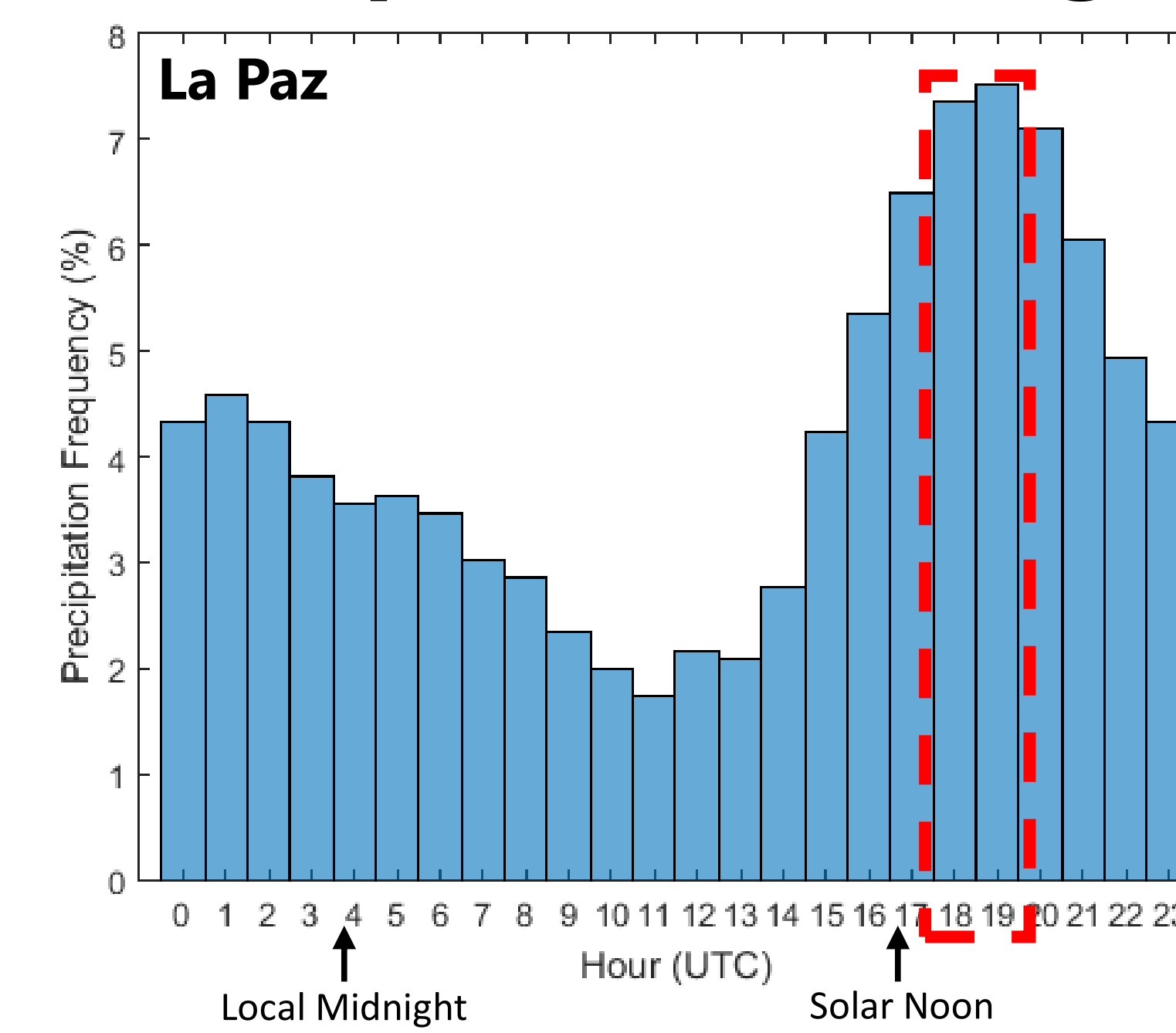


25 February 2016; La Paz, Bolivia

Total Precip (mm)	Average Temp (°C)	Maximum Reflectivity (dBZ)	Mean Column Reflectivity (dBZ)	Median MLH (m asl)
15.6	12.3	40	12	5129



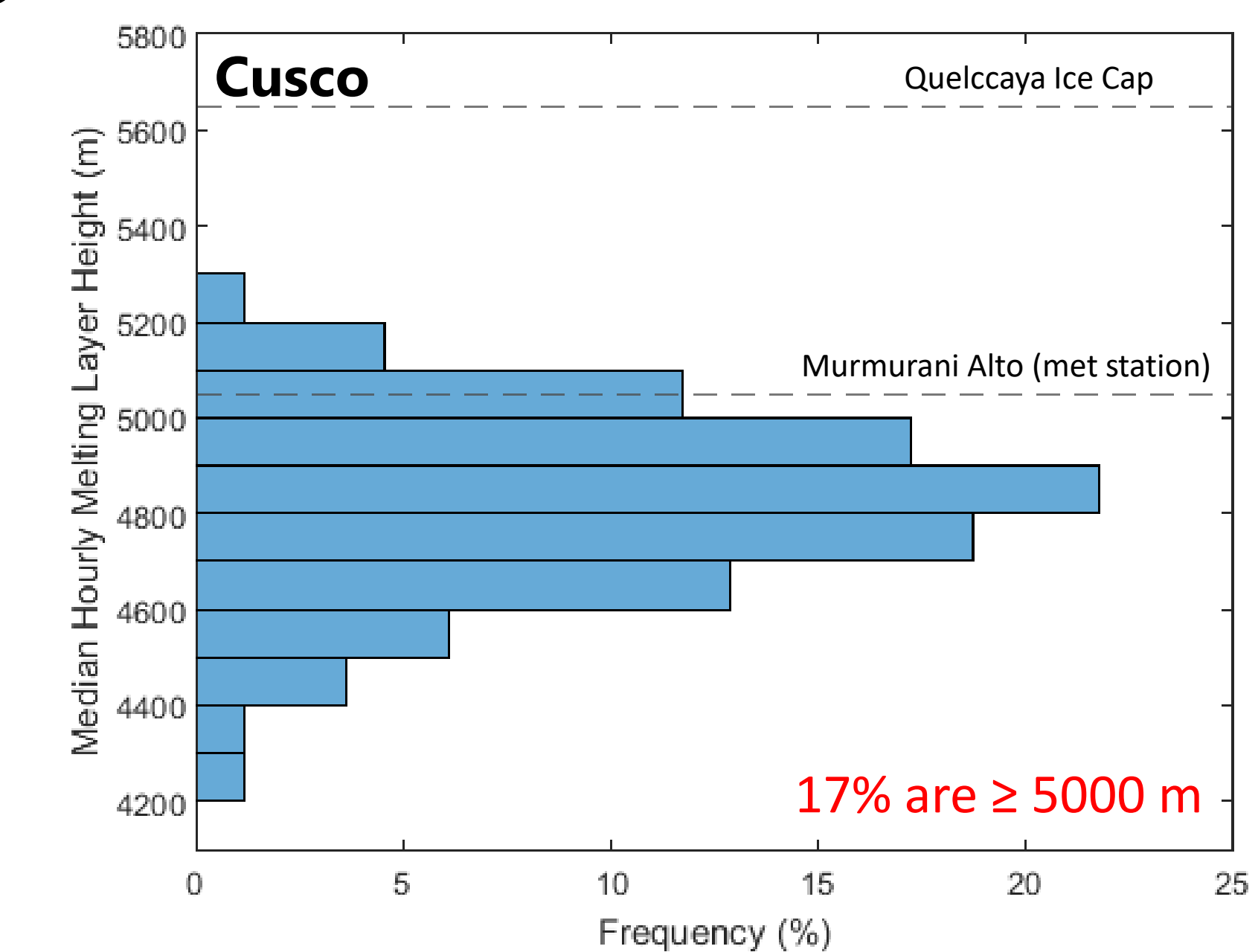
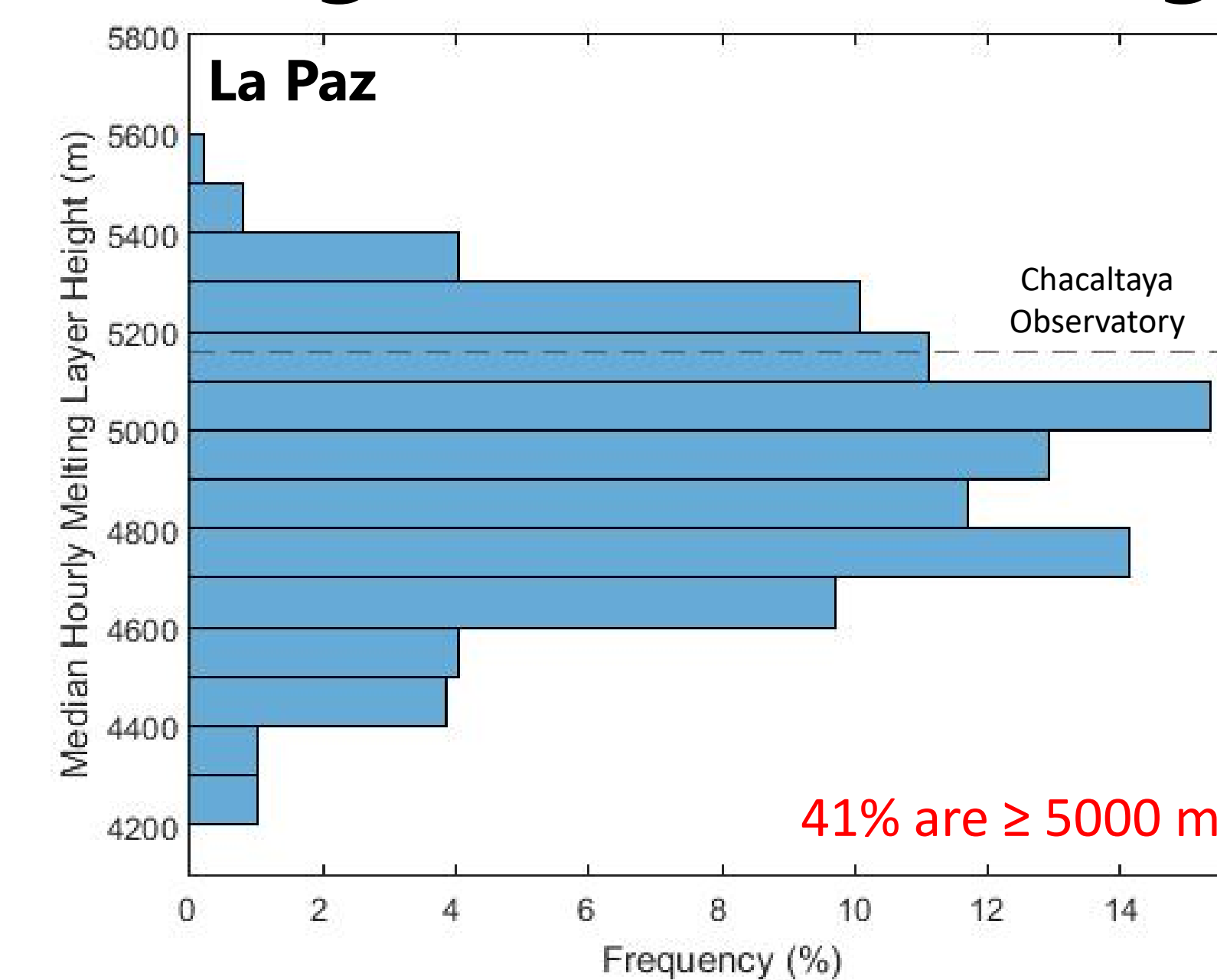
1. Precipitation timing



2. Precipitation duration and intensity

Location	Hour (UTC)	Mean Vertical dBZ	Mean Event Duration (hr)	Median MLH (m asl)
Cusco	13-18	6	0.21	4831
	19-00	9	0.39	4907
	01-06	10	0.48	4815
	07-12	7	0.31	4714
La Paz	13-18	7	0.24	4962
	19-00	7	0.28	4963
	01-06	9	0.54	4881
	07-12	7	0.38	4905

3. Height of the melting layer



Findings

- Events that occur overnight (0100-0600 UTC) are largely stratiform in character, which would contribute the largest accumulation to glacier surfaces.
- The importance of afternoon convective precipitation to overall precipitation amounts is higher in La Paz, suggesting higher volatility to the amount of accumulation.
- Melting layer heights over La Paz were higher and more variable. This may be due to geographical location and/or atmospheric circulation during the collection year (2015-16).