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Large landslides are concentrated along Patagonian Ice Sheet margin

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Deglaciation of mountain ranges promotes landslides of various scales and types, and many of them may present a major hazard. It is commonly thought that the main concentration of landslides is located in parts of the mountain ranges that have pronounced topography, high amount of precipitation and strong tectonic activity. Based on our mapping of large landslides ($>1\text{km}^2$) over an extensively large area of Southern Patagonia ($\sim 305,000\text{ km}^2$), we show that the distribution of landslides can have the opposite character. The largest landslides within the limits of the former Patagonian Ice Sheet (PIS) are concentrated along its eastern margins and thus occupying lower, tectonically less active, and arid part of the Patagonian Andes. In contrast to the heavily glaciated, highest elevations of the mountain range, the peripheral regions have been glaciated only episodically. However, a combination of glaciation, weak volcanic and sedimentary rocks, sufficient relief, and presence of large glacial lakes in the past, created favourable conditions for formation of huge number of large landslides along eastern margin of PIS. We explain the scarcity of large landslides in the highest parts of the PIS by presence of strong granitic rocks and long-term glacial modification, that adjusted topography for efficient ice discharge. Our model is limited to large bedrock landslides as shallow slides and rock falls are abundant in the highest and western part of the Andes.