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Glacial-Periglacial transition as a Catastrophe Theory model. The case of the Natural Park of Peñalara Glacier (Spanish Central range)

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Deposits and landforms show the evolution phases of the Natural Park of Peñalara Glacier from a full glacial development toward a periglacial environment in late pleistocene. The transition shows evidence of both progressive and catastrophic events. The small size of the glacier (approximately, 2km long and 2 km wide) did not avoid great differences in its dynamics, which can be explained in terms of Catastrophe Theory as the result of very small differences in the control variables. The glacier accumulation area had two main cirques (Peñalara Lake and Dos Hermanas). While the Peñalara Lake cirque retreated in several phases, with stabilization stages in between, the Dos Hermanas cirque show evidence of a continuous retreat, with only one stability stage in the late moment, when the glacier had disappeared and a rock-glacier formed in the former accumulation cirque. The cusp model of the Catastrophe Theory show how this differences between Peñalara Lake and Dos Hermanas cirques could be the answer to small differences in pre-glacial conditions and ice accumulation.