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Constraints on the Younger Dryas climate from glacial moraines and a landslide-dammed paleolake in the southern Central Andes, NW Argentina

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The southern Central Andes of northwest Argentina feature a wealth of deposits that attest to formerly cooler and/or wetter conditions. Among these are well preserved glacial moraines on the highest ranges and lacustrine sediments at the floor of the intermontane basins. Unfortunately, the timing and magnitude of the recorded climatic signal in terms of past temperatures (T) and precipitation (P) are only loosely constrained. Here we present preliminary results from numerical reconstructions of a landslide-dammed paleolake in the Santa Maria Basin (SMB), and a glacial advance in a small catchment on the eastern side of the Sierra Aconquija, which both have 10Be-ages corresponding to the Younger Dryas. In the lake model we combined the energy balance and the bulk-transfer methods to compute modern evaporation for the SMB in a fully distributed manner. Next, we solved for T-P conditions, under which the lake level would stabilize at the inferred paleolake elevation of 1650 m asl. In the glacier model the mass balance is calculated following a positive-degree-day approach with spatially variable temperature and precipitation. We matched the Younger Dryas terminal moraine by adjusting T and P using different degree-day factors (1 – 5 mm/day/°C). Finally, we find an overlap in the hypothetical T-P conditions from both models indicating a temperature drop of 2 – 4 °C and a precipitation increase of 35 – 50 %. As such, we use the combination of two independent models to constrain the paleoclimatic conditions in this part of the southern Central Andes during the Younger Dryas.