



## **Distributed snow and ground models over a 67% glacierized basin in Bolivia (Zongo Glacier, tropical Andes) to study melting processes and to simulate water discharge**

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To determine the mass budget of Zongo Glacier (Cordillera Real, Bolivia, 16°15'S, 68°10'W) as well as the water discharge of its entire basin (6000 to 4830 m asl, 3.3 km<sup>2</sup>, 67% glacierized) (i) CROCUS snow model, (ii) Interactions between Soil-Biosphere-Atmosphere (ISBA) land-surface model and coupled ISBA/CROCUS model have been applied to a full set of meteorological data recorded both on the moraine and on the glacier at 5050 m asl between 5 August 2004 and 27 April 2006. These physical one-dimensional models have been adapted to tropical conditions, in particular the high level of solar radiation throughout the year and they are distributed over the basin with a spatial resolution of 100 m x 100 m. The main interest of this work is to better understand on the one hand, the physical processes involved in the melting both on the glacier and on the moraine, and on the other hand, to assess the relative water production of the glacierized parts (ablation computed with CROCUS) as well as the non-glacierized areas (ablation computed with ISBA and CROCUS-ISBA). A particular work has been developed to accurately assess the amount and the phase (snow or rain) of precipitation. Meteorological data are extended to each grid cell of the basin using a standard lapse rate and theoretical radiation model for short-wave incident radiation. The calculated temporal water production of the basin is compared to the discharge recorded at the limnimetric station at 4830m asl assuming

a time-transfer function depending on the grid cell location. Measured and computed ablation are also compared