ALBEDO ESTIMATION BY TERRESTRIAL PHOTOGRAPHY AND RUNOFF MODELLING OF A GLACIARIZED CATCHMENT ON ANTIZANA VOLCANO (0S, 78W)

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Surface Energy Balance (SEB) studies on Antizana glacier 15 (Ecuadorian Andes, inner tropics) show that albedo variations control the local melting at the glacier surface. In order to develop a hydrological model, the knowledge of distributed energy balance is necessary. Conventional terrestrial photography can be used as flexible and inexpensive remote sensing tool for albedo estimation. By georeferencing the image and geometrically and radiometrically correct the reflectance values recorded by an automatic digital camera, the spatial distribution of albedo is calculated and compared to field measurements. Considering that the shortwave radiative balance is the main forcing term of the SEB along the ablation zone, knowing the albedo spatial distribution allows the estimation of an accurate spatial SEB. The melting computed by this way is spatially distributed and constitutes the production function of a hydrological model. Parameters of the runoff transfer through the frontal moraine were determined thanks to brine injections at the glacier snout, conducted together with electrical conductivity measurements downstream. Finally, the computed and measured runoffs are compared and the performance of the model is assessed.