



Title : Simulations of Glaciar Zongo (Bolivia, 16°S) changes over the 21th century using the full-Stokes ELMER/ICE model

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In Bolivia, the Cordillera Oriental gathers more than 1800 glaciers covering an area of about 450 km². Water resources from these glaciers are of major concern for the Bolivian Altiplano where the capital of the Bolivia - La Paz - is located. The Zongo Glacier is located at about thirty kilometers from La Paz and flows on the south-east side of the Huayna Potosi which culminates at 6088 m a.s.l. This glacier is monitored within the context of the GLACIOCLIM Observatory since 1991 and has an extensive network of glaciological, hydrological and meteorological measurements. Studies show a significant retreat since the last maximum of the Little Ice Age with an acceleration since the late 1970s in relation to climate changes [Rabatel et al., 2013]. The recent bedrock mapping of this glacier allows a detailed study of the glacier's dynamic in order to project its evolution over the next century. The three dimensional, thermo-mechanically coupled full-Stokes model, Elmer/Ice is mainly developed by the LGGE (EDGE team). The aim of this study is to adapt this model in order to simulate the evolution of the Zongo Glacier over the current period (1997-2006) with as input the available field data (surface topography, bedrock, surface mass balance, surface velocities). After validation over the current period, using field data (mapping of the outline of the ablation area measured by DGPS) and volume changes calculated for the period 1997-2006 [Soruco, 2008], simulations of the evolution over the next century were conducted. The atmospheric temperatures for the study area (15-18°S et 68-70°W), from different models included in the CMIP5 project are used considering three IPCC scenarios over the next century. These temperatures allow an estimation of the position of the ELA and thus of the vertical profile of mass balance used as input of the model.