

Using Flow Line Modelling, Remote Sensing for Reconstructing Glacier Volume Loss Model for Athabasca Glacier, Canadian Rockies

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Abstract : Glaciers are one of the main sensitive climatic indicators, as they respond strongly to small climatic shifts. We develop a flow line model of glacier dynamics to simulate the past and future extent of glaciers in the Canadian Rocky Mountains, with the aim of coupling this model within larger scale regional climate models of glacier response to climate change. This paper will focus on glacier-climate modeling and reconstructions of glacier volume from the Little Ice Age (LIA) to present for Athabasca Glacier, Alberta, Canada. Glacier thickness, volume and mass change will be constructed using flow line modelling and examination of different climate scenarios that are able to give good reconstructions of LIA ice extent. With the availability of SPOT 5 imagery, Digital elevation models and GIS Arc Hydro tool, ice catchment properties-glacier width and LIA moraines have been extracted using automated procedures. Simulation of glacier mass change will inform estimates of meltwater run off over the historical period and model calibration from the LIA reconstruction will aid in future projections of the effects of climate change on glacier recession. Furthermore, the model developed will be effective for further future studies with ensembles of glaciers.

Keywords : flow line modeling, Athabasca Glacier, glacier mass balance, Remote Sensing, Arc hydro tool, little ice age

Conference Title : ICGES 2016 : International Conference on Geography, Environment and Society

Conference Location : Vancouver, Canada

Conference Dates : August 04-05, 2016