



Determination of sub-daily glacier uplift and horizontal flow velocity with time-lapse images using ImGRAFT

Pascal Egli (1), Ken Mankoff (2), François Mettra (1), and Stuart Lane (1)

(1) Institute of Earth Surface Dynamics, Université de Lausanne, Switzerland (pascal.egli@unil.ch), (2) Department of Geosciences, Pennsylvania State University

This study investigates the application of feature tracking algorithms to monitoring of glacier uplift. Several publications have confirmed the occurrence of an uplift of the glacier surface in the late morning hours of the mid to late ablation season. This uplift is thought to be caused by high sub-glacial water pressures at the onset of melt caused by overnight-deposited sediment that blocks subglacial channels. We use time-lapse images from a camera mounted in front of the glacier tongue of Haut Glacier d'Arolla during August 2016 in combination with a Digital Elevation Model and GPS measurements in order to investigate the phenomenon of glacier uplift using the feature tracking toolbox ImGRAFT. Camera position is corrected for all images and the images are geo-rectified using Ground Control Points visible in every image. Changing lighting conditions due to different sun angles create substantial noise and complicate the image analysis. A small glacier uplift of the order of 5 cm over a time span of 3 hours may be observed on certain days, confirming previous research.