IPA Action Group "Rock glaciers inventories and kinematics"

Kick-off meeting

Chamonix, 28 June 2018

Motivation of the IPA Action Group *(presented by R. Delaloye - RD)*

Abstract + Presentation

Rock glacier inventories (RGI) have been set up in many regions in the world for decades but without any real coordination between them. With the ongoing development of remote sensing technologies and the increasing availability of high-quality data, it is becoming more and more "easier" to perform such inventorying work. The motivation/purpose behind RGIs may differ, e.g. national inventory vs. research driven inventory. Different typologies and representations of rock glaciers are existing. The accessibility to existing inventories is somehow limited.

- ⇨ There is an obvious need for coordination and as far as possible also for standardization.

Rock glaciers have been classically inventoried as intact (active/inactive) and relict landforms based on morphological indices. Recent development in remote sensing technologies allow a more detailed kinematic information within RGI, as displacement rates can be observed and outlined. In this perspective, GlobPermafrost and CCI+ promote inventories of mass wasting processes. Monitoring rock glacier velocities provide key information on the impact of climate change in mountain regions, as there is a correlation between rock glaciers activity rate (velocity) and temperature (e.g. *Staub et al. ICOP 2016, Frauenfelder et al. ICOP 2003*).

Long time series show similar trends of the displacement rates of rock glaciers (outliers are of course occurring), which suggests a common process. With that, there is the possibility to exploit *in situ* data to obtain a more in depth understanding of the creep process. In regions where no *in situ* data exists, remote sensing data can be used to generate creep rate velocities (*e.g. GlobPermafrost workshop – Barboux*).

- ⇨ Would it not be possible to develop a regional indice for rock glacier activity (kinematics)?

Objectives (RD)

1. The Action Group intends to sustain the first steps towards the organization and the management of a network dedicated to rock glacier mapping and monitoring in all relevant mountain regions on Earth and to define the necessary standards, which can only be done through a common project.

2. The Action Group expects that rock glacier kinematics (permafrost creep rates) could be recognized by the permafrost community (GTN-P) and later by the WMO as a new associated parameter to the Essential Climate Variables (ECV) of permafrost.

3. The main objectives is to set up **generally accepted guidelines for inventorying rock glaciers**, including information of the kinematic behaviour of rock glaciers and to design and establish a dedicated **web platform allowing an open access to rock glacier inventorying and monitoring data**.

The IPA supports this Action Group for **2 years** (from EUCOP 2018 to ICOP 2020).

Discussion *(summary of comments by participants)*

Databases of RGI do exist; however, they are not homogenized and are on different platforms, e.g. RGI within the glaciers inventory database.

The need to launch a platform dedicated for RGI is necessary. It would allow to have accessible and homogenized data.

A key point when setting up inventories is to give a **clear definition** of **what** is being inventoried. Therefore, it is important **to define what a rock glacier is** and what are the guidelines used to map them.

The standardized guidelines should be applicable in different contexts, e.g. rock glaciers in the Andes vs. rock glacier in the European Alps.

Even with standardized guidelines, there would still be some variability in the data quality, e.g. remote sensing.

Objectives and scope of the Action Group (RD)

Task 1: *definition of a rock glacier*

1. Integrate a ***working*** definition of a rock glacier. This definition should guide the observations made when working on an inventory.
2. Define widely accepted ***standard guidelines*** for inventorying rock glaciers (what do we observe exactly? Is it an outline, a point on a map?).
3. Set up ***practical*** guidelines which will be based according to the first two points, allowing a standard procedure for inventorying rock glaciers (*how* to do it).

Three working groups should be organized to prepare the information needed to answer the three above mentioned points. The gathered information should be presented in a workshop, in which an accepted document answering task 1 and its 3 sub-tasks should be finalized.

Task 2: *fulfil the ECV requirements – preparation of the products*

Promoting the use of satellite imagery: monitoring rock glacier dynamics at a regional scale.

> Preliminary proposal was submitted to the European Spatial Agency (ESA) in reply to its Climate Change Initiative (CCI+) call on Permafrost to support some objectives of the initiative.

Integration of *in situ* data and experience in regions such as the Alps, Andes, Tien Shan, etc.

To be developed according to achievement of Task 1

Task 3: *operational development a database*

TBD in a next step

Others *(comments by participants)*

Important to include kinematics as a variable for climate change. Past, present and future observations of rock glaciers' behaviour are significant for the understanding of the evolution of climate and permafrost.

Global Climate Observing System (GCOS) has defined potential methods to define ECVs. The description of the ECVs is independent of the method used. It is therefore in this Action Group's hands to bring the knowledge to GCOS that the kinematics of rock glaciers is an essential variable for the understanding of permafrost (mountain permafrost). GCOS is open to evolve in the definition of these ECVs.

Development of a database (RD: so far there are no resources available for *task 3*, however it is open for promotion and the Action Group will support it).

The development of an operational database should be hosted under the GTN-P network.

It is important to undertake this Action in a pragmatic way. Include representative landforms, clear examples. However, there are numerous transitional landforms that should also be taken in account when working on an inventory. All landforms potentially have an important climatic signal.

Proposition to host a workshop dedicated to this Action in Austria in October 2019 (A. Kellerer-Pirklbauer).

- Abstract

Julie Wee / Maria Winterberger
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