Wrap-up of IPA AG Task 1 preparatory workshop - Chambéry (France) - 20 March 2019

CB, CP, FB, JW, KM, MK, PP, RD, RS, TE, XB.

Eleven people from four different countries (France, Italy, Peru, Switzerland) attended the meeting. Whereas the entire group was experienced in mountain permafrost studies, not all the participants have already practiced the compilation of a rock glacier inventory.

The aim of the meeting was to pave the basement for the forthcoming Workshop I of the Action Group, to be held in September 2019, by exploring the feasibility of defining *widely agreed standard guidelines for inventorying rock glaciers, including information on the activity rate* (Task 1 of the Action Group initiative).

As a **background to the discussion,** it was reminded that rock glacier inventories have been compiled for decades in many mountain regions. Because of the lack of international coordination and for other valid reasons (e.g. different background, different purposes, different primary data, etc.), the homogenization of those existing inventories under a common database is very challenging. Considering the increasing availability of high-quality open-access remotely sensed (optical and SAR) data and consequently the increasing number of projects (re-)inventorying rock glaciers, *we believe that the scientific community of concern is now ready to define common guidelines for the compilation of new inventories, the adaptation of existing ones, hence leading – as a final objective – to the merging of all inventories in a more homogeneous, open-access worldwide database.* The aim of Task 1 is to define as far as possible common rules and not already to think about how to implement them in a database.

To open up the discussion during the workshop, various experiences on inventorying rock glaciers were presented, with examples from the Italian, Austrian and Swiss Alps, as well as from the central semi-arid Andes (Presentation X. Bodin / Presentation P. Pogliotti / Presentation R. Scotti & F. Brardinoni / Presentation F. Brardinoni & al.). The second part of the meeting was devoted to an open discussion on the following questions:

1. Why inventorying rock glaciers?

   Though rock glaciers are occurring in the landscape (geomorphological heritage items), they are mostly not visible for people lacking of any background in mountain geomorphology. **Inventorying rock glaciers is making them existing (visible).**

   Scientific motivations for inventorying rock glaciers, or for using/applying a rock glacier inventory (important is to note that the motivation for inventorying and later exploiting an inventory by a third user may strongly differ) can be summarized as follows:

   - proxy for (past or current) permafrost occurrence
   - paleo-climate reconstruction
   - water (ice) content estimation
   - geohazards assessment
   - climate (change) impact

   There has been basically two main ways of inventorying rock glaciers: a) **(geo)morphological approach**: identification of permafrost creep related features by visual inspection of the (imaged) landscape; in addition, DEM-derived products or surface texture analysis may also have been used; b) **kinematical approach** (more recent): detection of surface motion (e.g.

InSAR-derived inventories). Resulting inventories may strongly differ depending on the approach (e.g. a relict rock glacier cannot be detected by a kinematical approach).

2. What is a rock glacier and how to identify it in the landscape (working definition)?
    - A rock glacier is a landform associated to the creeping of perennially frozen ice-debris mixtures,
    - visually detectable in the landscape by the occurrence of morphological flow structures that, connect a source area (rooting zone) to a steep front, which we consider as an essential morphological indicator,
3. Should we consider their origin to classify rock glaciers?

    Yes, because rock glacier identification and characterization (e.g. ice content), as well as assignation of attributes (e.g. landform outlining, definition of the rooting zone) may strongly differ depending on the origin (source area).

    - **Talus derived** (debris dominantly originating from the erosion of headwall)
    - **Glacier derived** (continuity from a glacier/ice patch to a rock glacier feature; distinction between glacier and rock glacier not easy/feasible; embedding of glacier ice within the rock glacier is likely to occur)
    - **Glacier forefield derived** (continuity from the glacier/ice patch system to the rock glacier feature restricted to phases of glacier advance (e.g. Little Ice Age); embedding of glacier ice within the rock glacier is possible; the glacier/ice patch may have nowadays completely disappeared or is disconnected from the rock glacier)
    - **Debris mantle derived** (absence of any headwall, the debris are not gravitationally displaced but provided in situ to the rock glacier)
    - **Landslide derived**
    - Other
    - Polygenic features…
4. How to handle complex features (genesis/overlapping/multi-generations/etc.)?

    Subject to discussion and difficulties to find agreement.
5. Activity rate?

    Subject to discussion and difficulties to find agreement.

    Is it worth of keeping the classical distinction (active/inactive/relict or intact/relict)? Is it worth of adapting it? If yes, how to integrate/use kinematical data within such a classification?

It has been encouraging to see that a good agreement has been found quite easily on some issues (e.g. questions 1 and 2) between the participants, but discussions on other points also brought out a lot of (new) questions and divergences.

To open discussion with all the Action Group members, a more comprehensive document with suggestions/propositions is in preparation. It will be made available in the coming weeks.