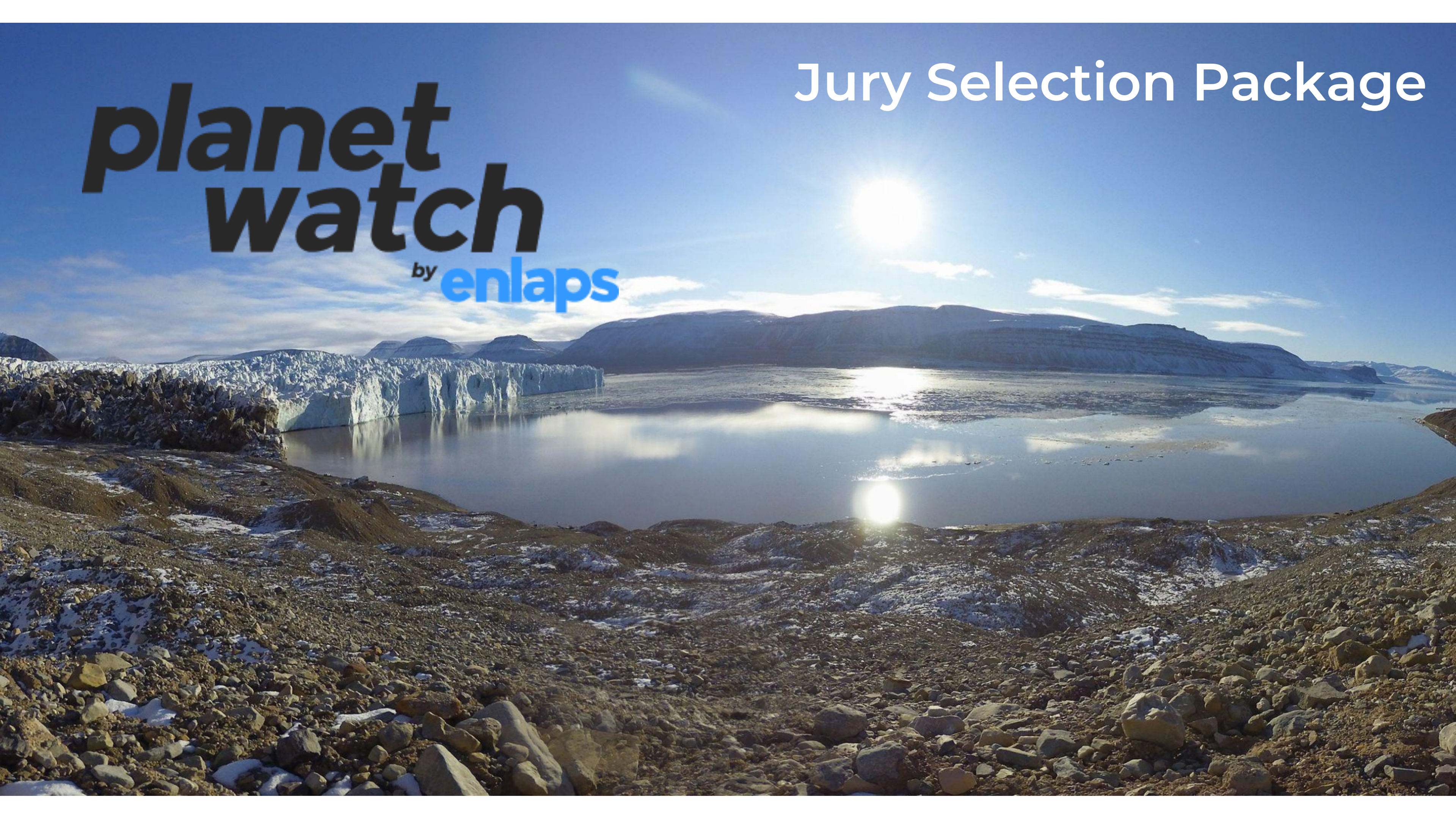


Jury Selection Package

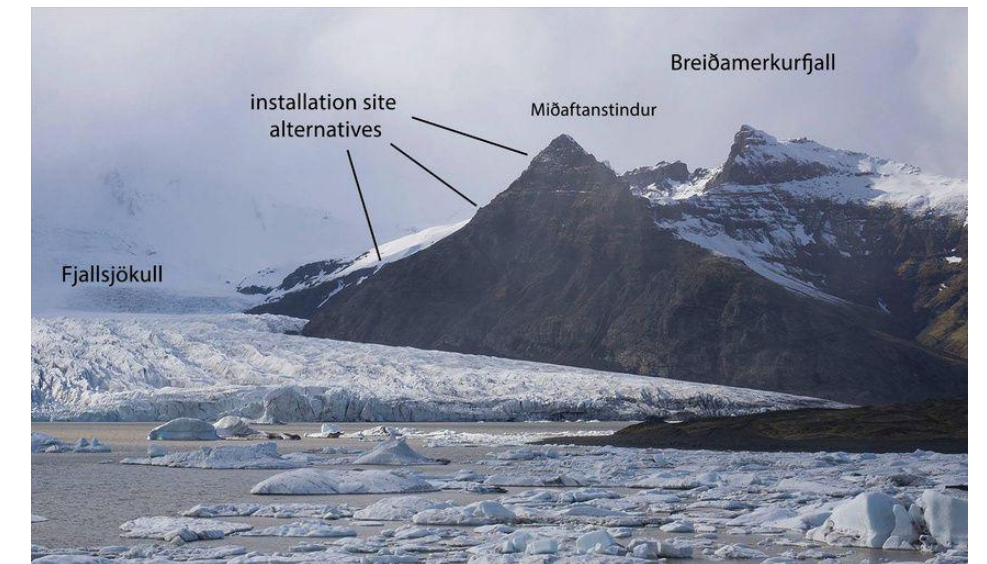
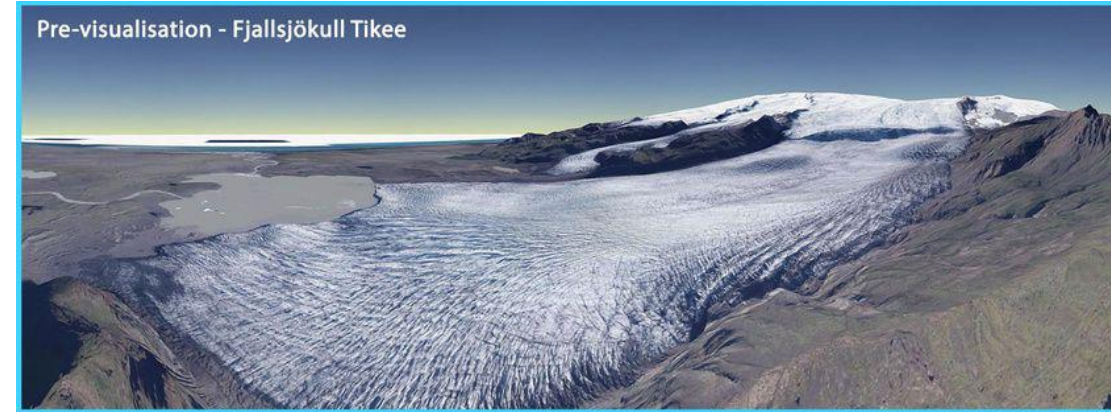
**planet
watch**
by **enlaps**



Fjallsjökull glacier - Iceland

Kieran Baxter

Climatevis



Been monitored : Since the 1930s (Terminus measurements by volunteers of the Icelandic Glaciological Society + Satellite-based glacier and landslide monitoring)

Scientific interest : The proposed camera location is on the mountainside to the north of the glacier and takes in several features of scientific significance. These include the Fjallsárlón pro-glacial lake, glacier calving front and an icefall region below the accumulation zone where ice mass movement is not currently well understood. The view also takes in the summit of the Öräfajökull stratovolcano and overlooks a fissure which has recently been observed in the Miðaftanstindur mountain above the glacier, a possible early sign of a large landslide.

Global warming impacts : The ice surface is more difficult for tourists to reach on foot, the reduced pressure on the hillsides that flank the glacier has also increased the risk of landslides, which can result in tsunamis in the lake. Also, reduced pressure from melting ice is predicted to lead to an increased risk of future volcanic activity there.

Impacts on local population : The risks mentioned above pose an immediate threat to people living and working in the area, they also threaten tourism, now a primary driver of the local economy.

Touristic area : Between 250-300k visitors per year

When and how installation will be done : March-May 2022, by boat/cable trolley and foot

Temperature on site : -12°C to 20°C

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : Yes, and is often on site

4G coverage : Excellent, data can be retrieved 2-3 times a year



Vatnajökull ice cap
Southeast Iceland
64° 2.209'N, 16° 26.232'W

Rhonegletscher glacier - Switzerland

Aaron Cremona, Matthias Huss, Daniel Farinotti
ETH Zurich, Laboratory of Hydraulics, Hydrology and Glaciology (VAW)



Been monitored : 1880-2021 (Geodetic measurements, in situ seasonal mass balance measurements, glacier length, flow velocities measurements, ice thickness, seismicity, etc.)

Scientific interest : Observe enlargement of the proglacial lake, and related processes, such as the sudden uplift of the tongue within the lake that occurred in September 2021. Delivers daily estimates of ice melting that are subsequently processed in an operational framework (CRAMPON) to provide near-real-time glacier mass balance estimates. Overall changes (surface, outline changes) occurring at the glacier. Their planned set-up has both a focus on qualitative visual change assessment at a scenic site, and quantitative observation of local melt rates.

Global warming impacts : Since 1880 there has been a retreat of about 1.5 km in length. A lake has formed at the terminus of the Rhonegletscher.

Impacts on local population : Water availability is strongly related to the glacier especially during the summer period. Furthermore, Rhonegletscher is an important touristic attraction. It is not to be excluded that in the future, large masses may fall into the lake causing sudden release of water that could bring damages in the valley.

Touristic area : Yes, daily visits in summer (quite important affluence)

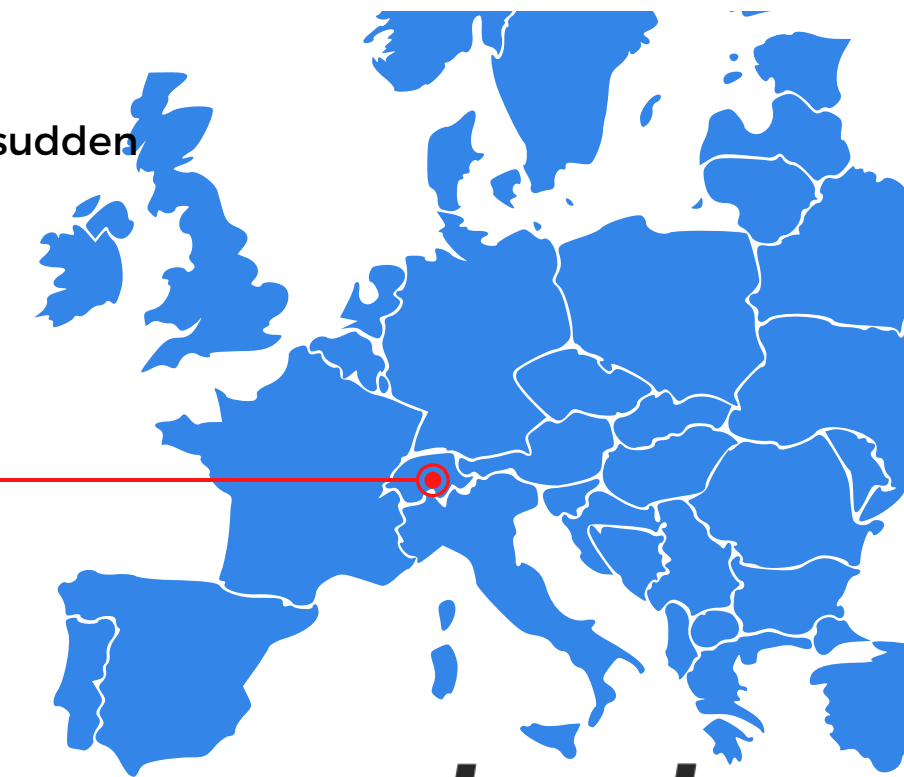
When and how installation will be done : May/June 2022, by foot (30min walk)

Temperature on site : -20 to +20°C (When only running between June and September : -5 to 20°C)

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : Yes , but the person is not on site

4G coverage : for sure there is 3G, maybe weak 4G connection (to be tested), data can be retrieved around 10 times a year



Central Alps of Switzerland
46°34'45.002"N 8°23'03.885"E

Gergeti glacier - Georgia

Levan Tielidze

Ilia State University



Been monitored : 1960s-1990s (Glacio-Hydro-Meteorological monitoring)

Scientific interest : Glaciers of the Kazbegi Massif (including Gergeti) play a significant role in the ecology and economy of Georgia. They provide a freshwater source that feeds rivers in this mountainous region. Glacier hazards are also relatively common in Kazbegi region, leading to major casualties. On the 20th of September 2002, for example, Kolka Glacier (North Ossetia) ($42^{\circ}44'0.26''N$ $44^{\circ}26'11.00''E$) initiated a catastrophic ice-debris flow killing over 100 people, and, on the 17th of May 2014, Devdoraki Glacier (Georgia) ($42^{\circ}42'52.38''N$ $44^{\circ}31'49.28''E$) caused a rock-ice avalanche and glacial mudflow killing nine people. Therefore, monitoring of Kazbegi glaciers is important for scientific and social reasons.

Global warming impacts : Gergeti Glacier lost ~42 percent of its area between 1882 and 2019 with its front retreating nearly 3 km.

Impacts on local population : Without this source of water, the region would be left drier and more vulnerable to wildfires. Glacier retreat is also a threat to local economies : tourism is important to the area, if the number of visitors declined significantly, it would result in economic consequences.

Touristic area : Yes, thousands of visitors each year

When and how installation will be done : August-September 2022, by 4x4 vehicle + horses

Temperature on site : $-10^{\circ}C$ to $2^{\circ}C$

Used some equipment similar to the Tikee solution : No

Person who can be trained to use the Tikee solution : Yes , but the person is not on site

4G coverage : Correct, data can be retrieved once every three months or even monthly, depending on the situation.



Kazbegi National Park
 $42^{\circ}40'39.04''N$ $44^{\circ}33'4.15''E$

Dynjgujökull and Kötlujökull - Iceland

Pavla Dagsson-Waldhauserova, Outi Meinander,
Bartek Lusk, Jan Kavan, Kamil Laska
Agricultural University of Iceland, Icelandic Aerosol and Dust Association



Been monitored : Since 2015 (Five ENLAPS cameras have been already running to monitor the dust storm activity in proglacial areas)

Scientific interest : Their scientific objective is to understand and see what happens when the rapidly receding glaciers disappear. Their research focuses the role on LAI such as Black Carbon (BC) and High Latitude Dust (HLD) on the cryosphere – albedo, melt, water retention capacity of snow. How fast is the process of ice changing into dust? Their philosophy is not observing only the extremely fast receding process of melting glaciers, but understanding also the consequent change of glacier into the dust hot-spot.

Global warming impacts : All five selected locations have critically changed in past ten years with some of the highest rates of retreat. dust hot spots are frequently flooded, but it does not prevent them from producing tens of millions tons of HLD annually. This in term have crucial impacts on fragile Arctic climate, eg deposition on cryosphere, mixed phase clouds alternation, atmospheric chemistry and marine primary production

Impacts on local population : Floods are closing the roads and affect tourism, HLD impacts the road safety as people have died in car accidents due to poor visibility. HLD impairs the air quality in vicinity of glaciers and dust hot spots.

Touristic area : Yes, tens of thousands tourists annually.

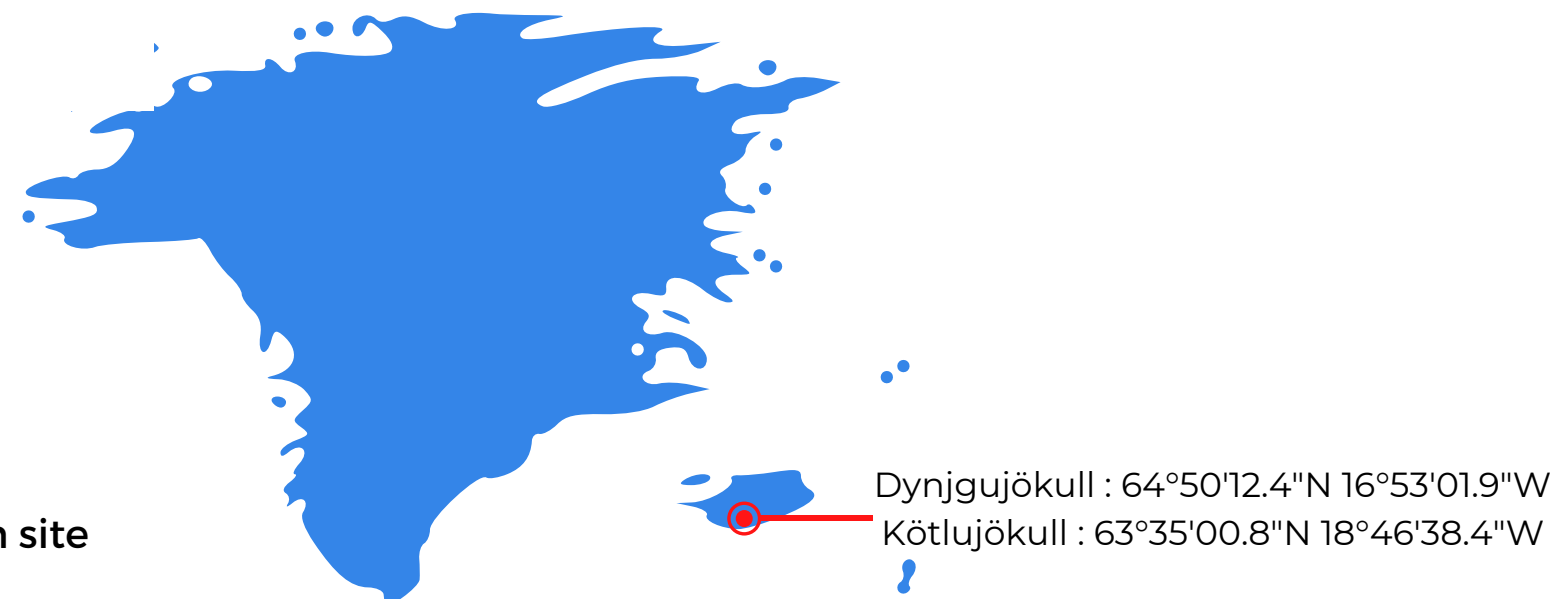
When and how installation will be done : June-July 2022, by jeep

Temperature on site : -10°C to + 20°C

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : Yes, and is often on site

4G coverage : Excellent



Donjek/Lowell glaciers - Canada

Luke Copland
University of Ottawa



Been monitored : Lowell Glacier for about 10 years, and Donjek for about 5 years (GPS stations + temp/RH sensors + cheap hunting-style cameras and Harbortronics SLR units)

Scientific interest : Both of these glaciers surge on a regular basis - approximately every 10-15 years - with the next surge of both glaciers due by the mid-2020s. They want to install new cameras before the next surge so that they can track its progression, such as where it initiates, how the surface elevation changes, what the ice motion is, and how the glacier terminus is impacted.

Global warming impacts : The relationship between global warming and surging is unclear. It seems that surges might be becoming more frequent at Lowell Glacier, and the extent of each surge is progressively smaller than the previous one at both Lowell and Donjek Glaciers. However, it's unclear whether changes in snowfall are impacting the surge periodicity.

Impacts on local population : Potentially quite severe impacts from the surges at Donjek Glacier, as when the glacier surges it dams a local river and creates a large proglacial lake. This then drains catastrophically, releasing a flood into downstream areas where there are recreational users.

Touristic area : Visited occasionally by hikers and rafters (only a few dozen people per year). Public access is pretty restricted.

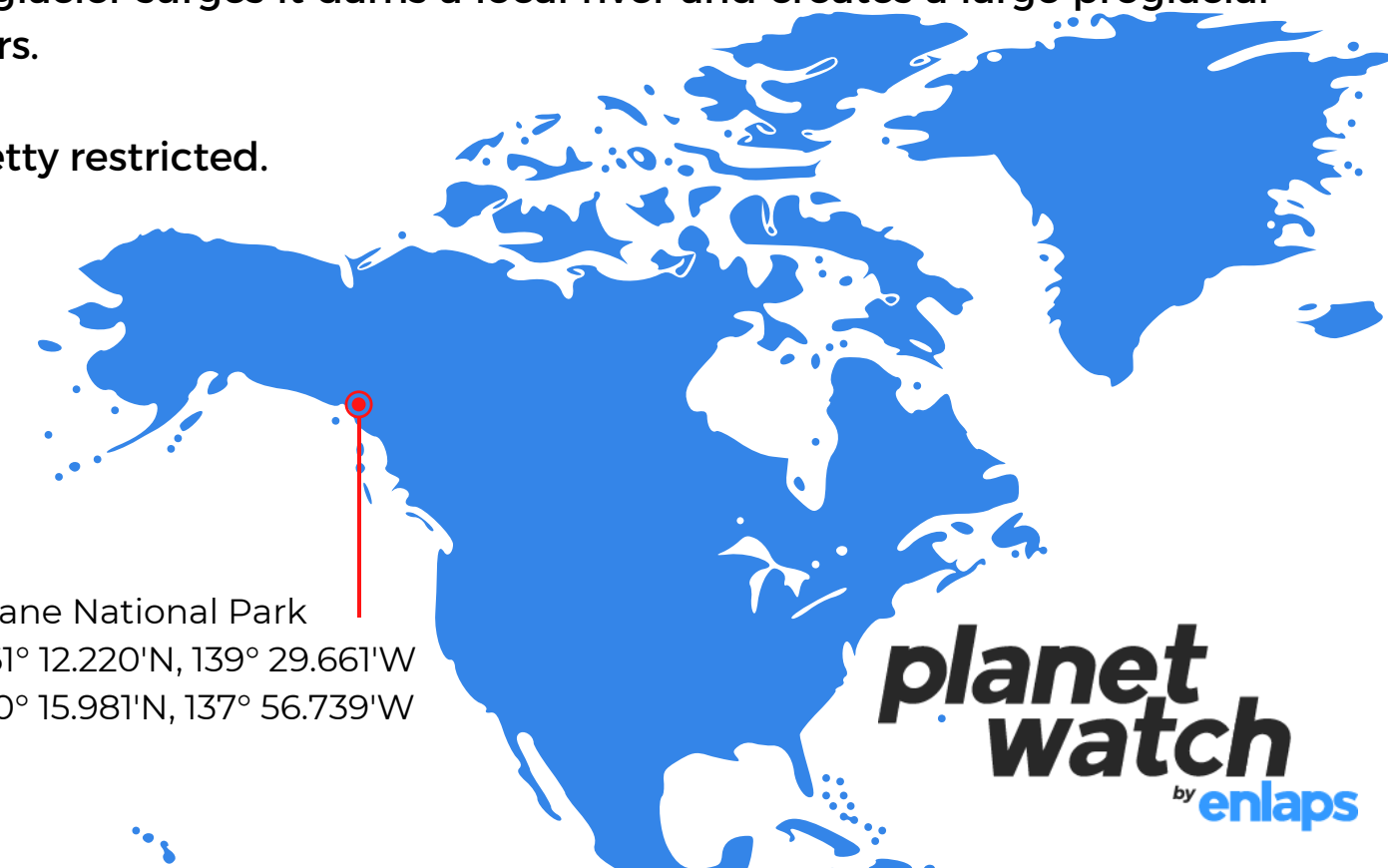
When and how installation will be done : June 2022, by helicopter

Temperature on site : -30°C in winter to +20°C in summer

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : Yes, and is often on site

4G coverage : None, data can be retrieved twice a year (June + September)



Kluane National Park
Donjek : 61° 12.220'N, 139° 29.661'W
Lowell : 60° 15.981'N, 137° 56.739'W

Forni glacier - Italy



Riccardo Scotti

Servizio Glaciologico Lombardo



Been monitored : since the late XIX century (meteorological investigations, energy and mass balance measurements, glacio-ecological studies, albedo measurements, hanging glaciers dynamics, hydrological modelling, dendrochronological studies)

Scientific interest : Forni glacier is the second largest glacier in Italy, located in the Ortles-Cevedale group. The scientific interest of this location is significant thanks to the multiple high mountain processes that will be monitored by the camera: 1) the terminus retreat of the right flank of the east arm of the glacier that is few meters distant; 2) the ice flow of the east arm of the glacier that produces a spectacular ice fall with seracs and crevasses; 3) The snow cover and glacier fluctuations of the main glacier body; 4) The S. Matteo peak landslide that started in December 2020 and is still developing with many small scale rock and ice fall events.

Global warming impacts : Area and volume retreat since the end of the Little Ice Age (about 3km). Main glacier body detached in three different ice fluxes.

Impacts on local population : The decrease of meltwater discharge can primarily affect hydroelectric production, the limitation of the touristic appeal, and the increase in danger of high-altitude mountaineering activities due to the increase in rock-fall activity caused by slope de-glaciation and permafrost degradation.

Touristic area : A great history of tourist attendance (ski-mountaineering activities in spring and summer mountaineering)

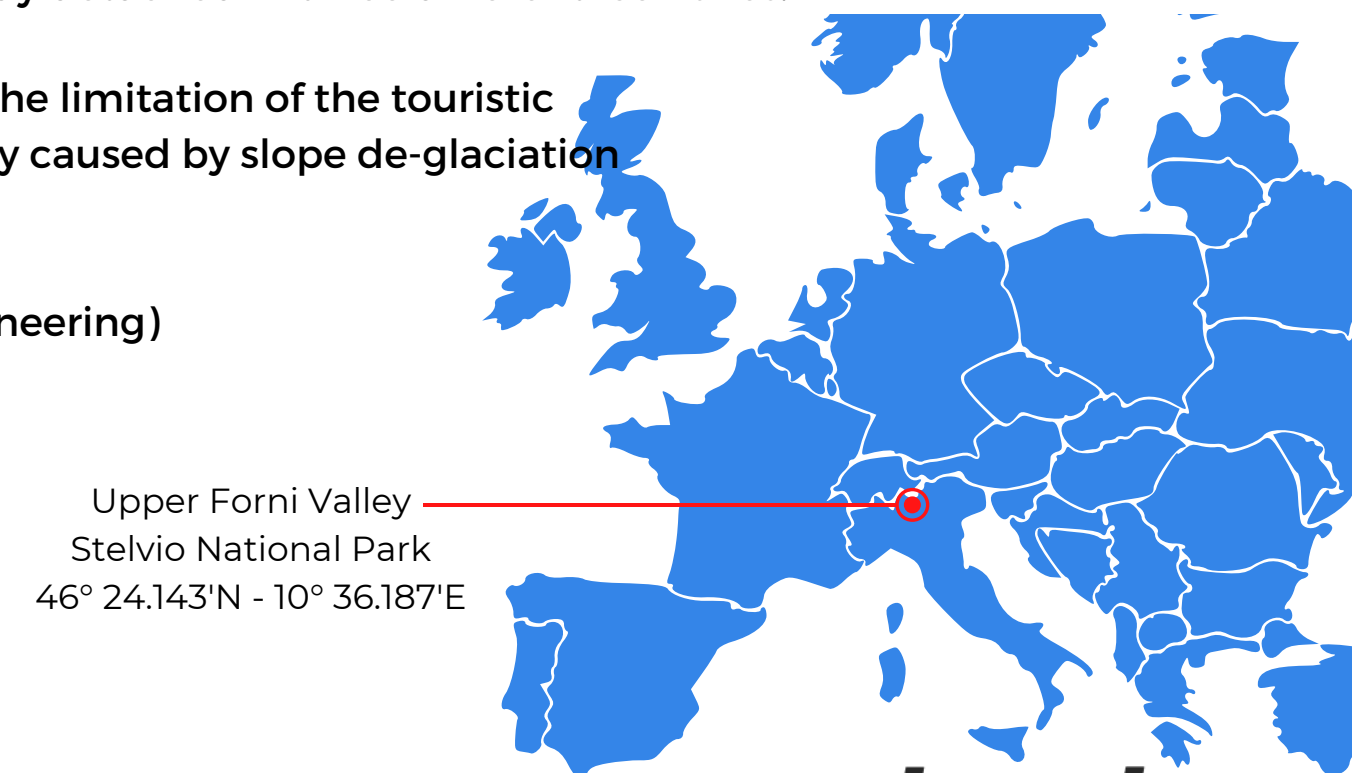
When and how installation will be done : April-May 2022, by foot or skis

Temperature on site : winter average is $-9.3\text{ }^{\circ}\text{C}$, daily min. average is $-12.2\text{ }^{\circ}\text{C}$ and daily max. average is $-5.7\text{ }^{\circ}\text{C}$.
Summer general average is around $+2.5\text{ }^{\circ}\text{C}$

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : Yes, and is often on site

4G coverage : Correct, data can be retrieved twice a year (more frequently if needed)



Upper Forni Valley
Stelvio National Park
46° 24.143'N - 10° 36.187'E

Greenland's ice masses

Jakob Abermann

Graz University

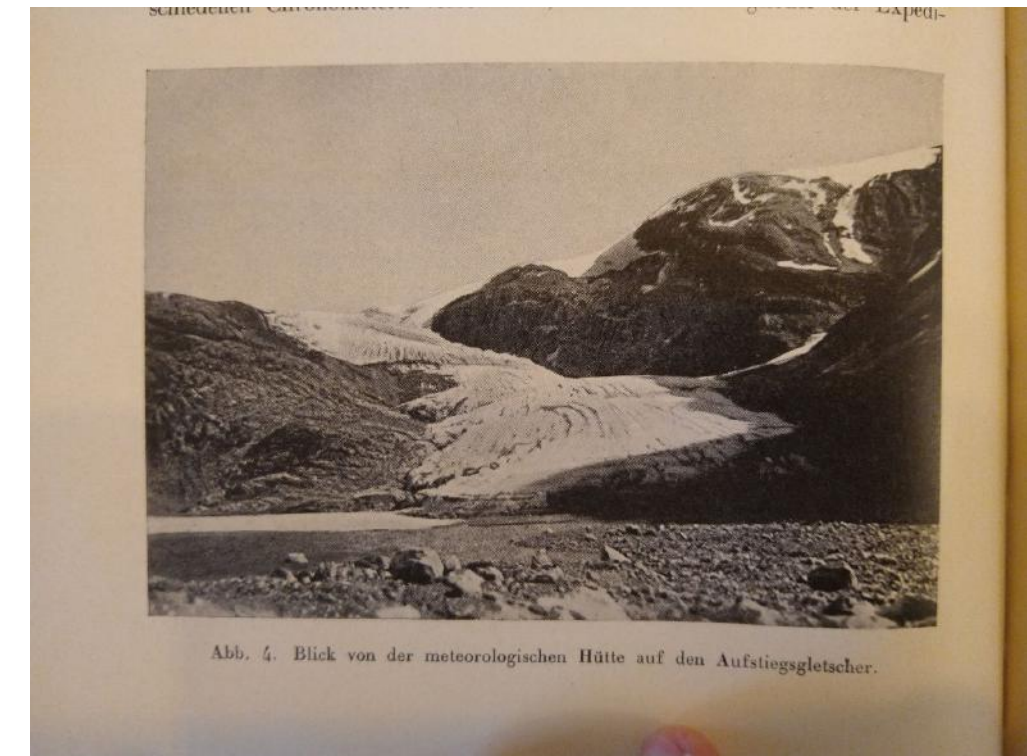


Abb. 4. Blick von der meteorologischen Hütte auf den Aufstiegs-gletscher.

Been monitored : 1929-1931 (climate/cryosphere research)

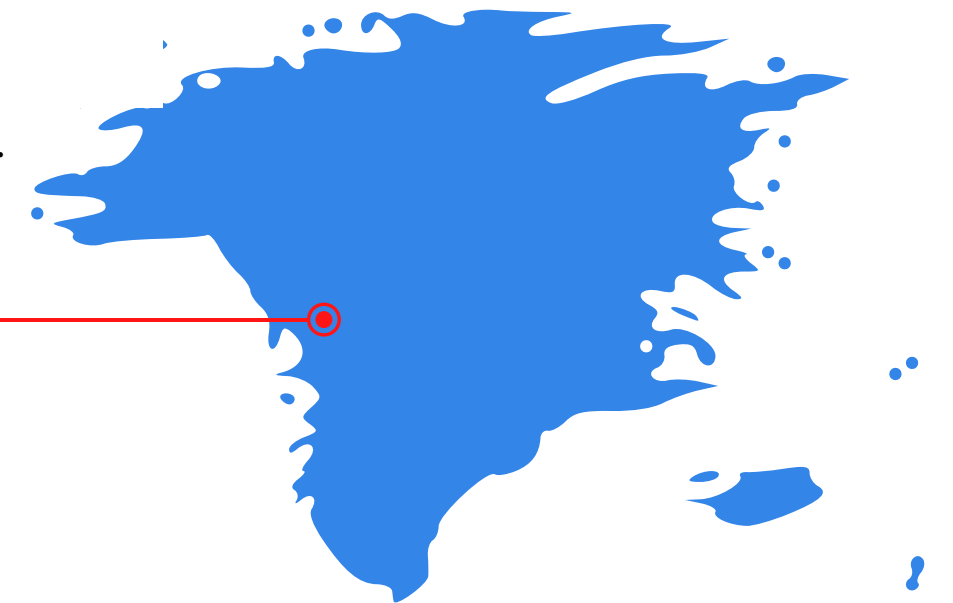
Scientific interest : Our project is based on archival data from the legendary expedition of the researcher Alfred Wegener in the years 1929-1931 : climatological and glaciological data were collected, these are of particular relevance because they were at the core of a short warm phase in which air temperatures were similar to those currently observed. Almost a century later, we will therefore again monitor the same parameters over three years at exactly the same measurement sites and under similar atmospheric conditions, albeit under fundamentally different geometric boundary conditions. We will expand the monitoring to include modern methods based on artificial intelligence and innovative process studies. This allows us to determine which factors are causing the observed changes and how glacier surface and atmosphere influence each other.

Global warming impacts : The melting Greenland Ice Sheet is currently one of the largest single contributor to sea-level rise.

Impacts on local population : Fishing and hunting are the main source of income for small communities in West Greenland. Changing ice cover means changing physical characteristics of the fjord and along with sea ice losses this impacts locals directly.

Touristic area : Few people come to this area but we are in touch with local stakeholders.

Qaamerujup Fjord, West Greenland
71.6192349, -51.8125967



When and how installation will be done : June / July 2022, by boat + helicopter

Temperature on site : -30°C to 15°C

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : We have collaborations with locals who could get there if needed.

4G coverage : None, data can be retrieved a couple of times per summer, maybe more often.

Hooker glacier - New Zealand

Aubrey Miller

Mountain Research Centre, University of Otago



Been monitored : 2000-2021 (satellite) + June 2021 to January 2022 (timelapse)

Scientific interest : Monitoring glacier retreat and other landscape changes in the Hooker Valley will help establish change rates and the exact timing of events (calving, mass movements). The valley is already monitored for snow avalanche activity using timelapse. An additional camera focused higher in the valley, will paint a more complete picture of the rate and timing of glacial changes. Coupled with satellite imagery we will be able to improve how we measure the rapidly changing iconic alpine landscape.

Global warming impacts : Rapid landscape change, glacial retreat and downwasting, destabilising mountain sides (snow and rock avalanches), serac collapse and landslides. The alpine region also gets extreme precipitation events and changes to the timing and distribution of snow, which is important for power generation and fresh water uses.

Impacts on local population : Abundance and timing of fresh water is the most salient impact to locals, as well as the impacts to tourism, which is focused on the national parks and alpine regions facing the greatest change from a warming planet.

Touristic area : Yes, national park with over 1 million visitors in 2019

When and how installation will be done : March 2022, by foot (1h30 walk)

Temperature on site : -10°C to 25°C

Used some equipment similar to the Tikee solution : Yes

Person who can be trained to use the Tikee solution : Yes , and is often on site

4G coverage : Weak or unstable (They could look at a different location for the camera that would have 4g signal.)

Hooker Valley,
Aoraki Mount Cook National Park,
170.11912°E 43.67541°S



Saint Sorlin glacier - France

Bruno Jourdain

IGE



Been monitored : 1957 - 2021 (annual mass balance measurements since 1957, annual winter and summer balances since 1994, topographic variables (fronts, velocities, thickness variations, surface area), radar measurements, meteorological measurements, hydrological measurements, modelling works...)

Scientific interest : The Saint Sorlin Glacier is one of the most documented glaciers in the French Alps with the second longest existing series of measurements (1957 - 2021); it is part of the glaciers monitored within the framework of the Service National d'Observations Glacioclim labelled by the INSU and the WGMS; it is recognized as a good indicator of climate change.

Global warming impacts : Very strong retreat of the glacier, disappearance expected before the end of the century

Impacts on local population : Local impact on the water resource (the water of the glacier in summer, dry period, supplies up to 50% of the flows measured in Saint-Jean d'Arve), tourist and landscape impact

Touristic area : Yes, very frequented sector in summer, quite frequented in spring

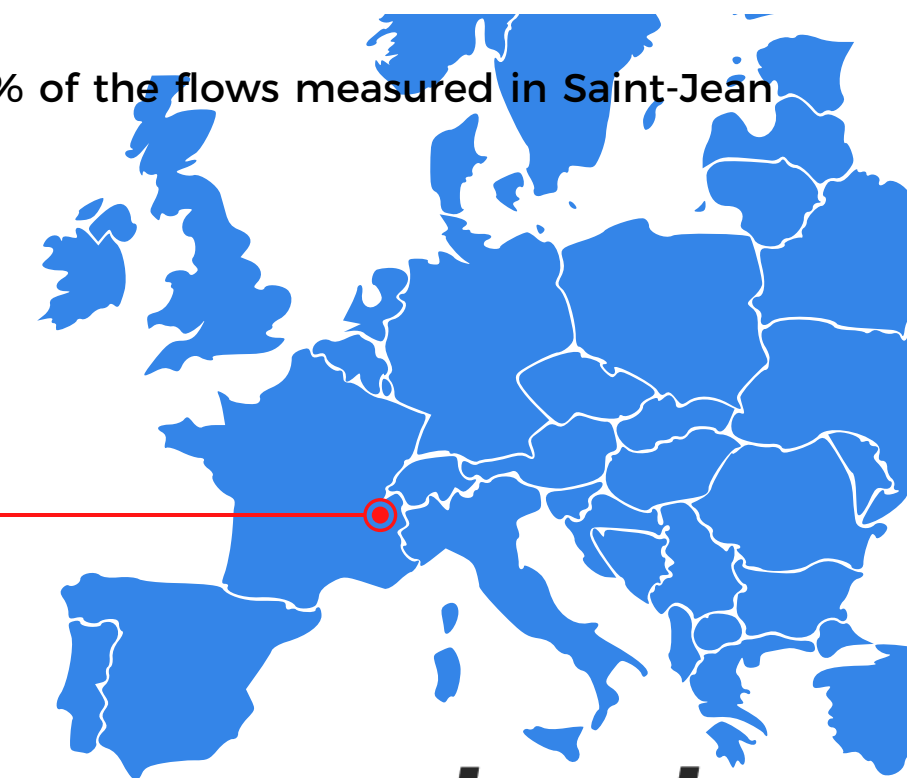
When and how installation will be done : mid April 2022, by foot

Temperature on site : -25°C / +25°C

Used some equipment similar to the Tikee solution : No

Person who can be trained to use the Tikee solution : Yes, and is often on site

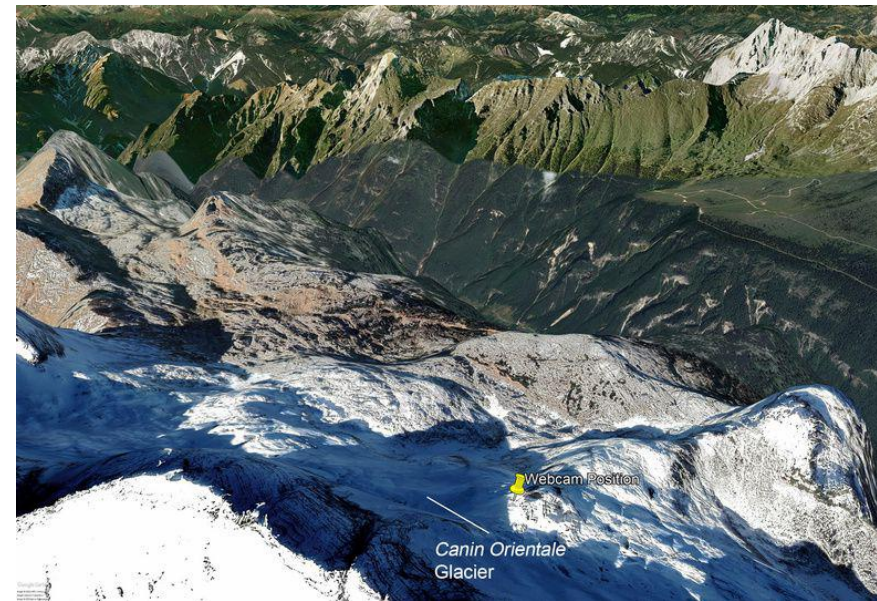
4G coverage : Correct (3G is OK, 4G less likely), data can be retrieved every month between May and October, + two times during winter



Grandes Rousses massif
45,1746°N - 6,1699°E

Canin glacier - Italy

Renato R. Colucci
CNR-ISP and A-AMS



Been monitored : since 1883 (besides traditional glaciological methods, multiannual geodetic surveys have been performed by using airborne LiDAR, theodolite measurements and GIS analysis. The internal structure and evolution of the glacier have been recently studied through Ground Penetrating Radar)

Scientific interest : Its long-term behaviour is strongly contrasting the observed trend of the vast majority of the alpine glaciers. Recent studies show how this ice body seems resilient to global and local warming. It is therefore extremely interesting to study such kind of minor glacial bodies through a continuous monitoring in order to follow their daily evolution. This would be possible only through a visual and continuous inspection of this area as a function of snowfall, avalanches and wind accumulation during the accumulation season, and looking at the ablation rates during the summer.

Global warming impacts : According to recent studies, the Canin east glacier ice patch together with other small glacial bodies in the area, had a positive mass balance in the last 15 years. The area recorded extreme and prolonged winter snowfalls that were sufficient to offset longer and warmer summers.

Impacts on local population : Conferences, meetings and seminars are time to time organized for the local population to raise awareness about the effects of global warming on cryosphere and nature in general.

Touristic area : The area itself is touristic but not easily accessible by people and only via mountain paths or alpinist rouths.

When and how installation will be done : End of June, beginning of July 2022, by helicopter (possible by foot too)

Temperature on site : -25.5°C to +19.6°C

Used some equipment similar to the Tikee solution : No

Person who can be trained to use the Tikee solution : Yes , and is often on site

4G coverage : Correct

Prealpi Giulie Natural Park
46°21'58.5"N 13°27'09.3"E



planet
watch
by **enlaps**