Universidad Nacional Costa Rica
c/o. Ian Christopher Godfrey
Laboratory of Atmospheric Chemistry

Date: 1. júlí 2024
Case number: 2208024

Subject: Universidad Nacional Costa Rica - Ian C. Godfrey - research permit

Vatnajökull National Park has received an application from Ian Christopher Godfrey of Universidad Nacional Costa Rica, dated August 3rd, 2022, for a research permit within Vatnajökull National Park. *The applicant asked for a renewed permit on June 3rd, 2024.*

Description of the project, according to the application:

Project name
Deploying UAS for Monitoring Iceland's Volcanic Systems

Date, timeline and duration of the project
This project will take place during the month of November. The field work will be going on all month and the complete publications should be finished by January 1st, 2023. *(New dates for 2024 are from June 12th to August 30th, 2024).*

Location inside Vatnajökull National Park
1. Fellsfjara 2. Jökulsárlón Glacier Lagoon 3. Svartifoss Waterfall 4. Skaftafell 5. Crystal Ice Cave Region 6. Askja Volcano (*Askja was later postponed until 2023*) 7. Additional volcanoes?

Description of the project, purpose and execution
The UAS project will take place November 2022. Drones will be flown no higher than 380 feet above ground level. All regulations will be followed. The purpose of the study will be to show the scientific community and students of Universidad Nacional how UAS can be deployed to accomplish investigative goals concerning fieldwork. Generation of digital maps and air quality tracking are a key aspect of this investigation. The goal is to demonstrate how these tools are being used to gather valuable information from safe distances. To show how UAS can map and log changes to glaciers and monitor meltwater rivers. The execution of the entire project (field work) will take place in November.

Description of methods for sample taking, if part of the research:
For videography the goal is to generate high quality video sufficient to create a Digital Surface Model of certain areas of the glacier and surrounding region. The Agrisoft software program will be used to generate these digital maps which can be used as a baseline to log and track melting associated with global temperature increases and climatic changes. The data collected will be used for academic publications and for students of Universidad Nacional Costa Rica studying volcanic systems. For volcanic emission monitoring and air quality tracking the Sniffer4D is used. This device can be carried by hand, ground vehicle or UAS. The Sniffer4D is attached to the Mavic 3 with an integration kit created with a 3D printer. The Sniffer4D is placed upside down and

the 3D printed mounting bracket is placed on top of the bottom of the device. The mounting bracket is then attacked with 4 M2.5*6 screws in each corner. The Sniffer4D and attached mounting bracket are then placed onto the Mavic 3 drone and the assembly is permanently connected via 2 additional M2.5*6 screws at the bottom. The Sniffer4D is powered by the same battery as the UAS itself, via a power cable. The power cable aligns to the two outermost power connectors of the Mavic 3 battery. The power cable is secured with three small pieces of double sided tape and is then attached to the Sniffer4D.The system has a total flight time of around 20 minutes depending on environmental conditions.

Other information that the applicant wants to submit
This type of UAS investigation has been successfully completed in Costa Rica and it would be an honor to deploy the same system at some of the volcanoes in Iceland. This November will be my first trip to the country and if there are other volcanic systems the park rangers wish to test with the Sniffer4D please tell me so we can work these regions into the itinerary. If it is possible to allocate a window of opportunity for this research such as a week or the entire month of November, it would be extremely beneficial as my understanding is the climate conditions change rapidly in Iceland. This window of opportunity will allow for better data accumulation and better overall chances of success along with less stress because more time can be allocated to the field work sections of this project. Any ideas, concerns or suggestions will be taken into consideration. Thank you for your understanding and support.

Conclusions and conditions:
Vatnajökull National Park hereby grants Ian C. Godfrey permission on its behalf to conduct research as described above on from June 12th to August 30th, 2024, on the following conditions:

- Keep this letter with you on site during the project, either printed or an electronic copy. The permit conditions should be introduced to the staff of the project before work begins.
- The permit holder shall inform Vatnajökull National Park before arriving in the area. The best way to do that is to “reply all” to the e-mail the permit was sent with.
- If the project dates or description changes, Vatnajökull National Park shall be notified as soon as possible.
- When it is necessary to go off-path, extra care must be taken not to cause damage to terrain, including vegetation, soil, and geological formation. All traces of activity must be removed afterwards.
- The permit holder should always stay on authorized paths/tracks/roads.
- The permit holder must follow rules of conduct that apply to the area.
- If the material is published anywhere, it must be noted in the video/subtext/credits that a permission from Vatnajökull National Park was obtained for the research.
- The permit holder must be conscious of other guests on the sites and make sure that filming causes as little disturbance as possible to other visitors.

Locations and site-specific conditions:

- Jökulsárlón and Fellsfjara – Drones are generally only allowed early morning or in the evening, (before 9:00 or after 18:00). Vatnajökull National Park recommends following those guidelines but acknowledges that it might be inconvenient for research purposes. If needed, flying the drone from the western side of Jökulsárlón is allowed during the day.
- *Svartifoss – for safety reasons and to ensure the quality experience of visitors, drones are not allowed in the area. Therefore, the request to research with a drone is declined, but surveying from the ground is allowed.*
- Skaftafell – Drones are generally not allowed in Skaftafell. Exceptions can only be made in front of Skaftafellsjökull, but only early in the morning or in the evening, before 9:00 or after 18:00).
- *Crystal Ice Cave Region (sic)* – This place does not exist, but the glacier cave some people used this name for was in Breiðamerkurjökull – Entering the caves can always be dangerous, but especially in warmer weather in summer. However, there are no site-specific conditions.
- Askja – Drones are generally not allowed in Askja. Exceptions can be made for research and some film production, depending on the importance of the project. Drones are only permitted from 19:00 to 08:00 (20:00 to 08:00 in July), provided that no-one else is in the area.

About research

- This permit is only valid for research purposes.
- Vehicles used during field exploration must be labelled with the identity of the researcher's institute. During field work, all participants in the project must wear clothing labelled with the identity of the researcher or the research institute. High-visibility clothing is preferred.
- A permit from the National Energy Authority might be needed for research in geothermal areas (www.os.is).
- The use of a generator requires a special permit from the national park manager. The conditions for a permit are based on environmental considerations and the quiet experience of others in the area.

About drones

- An unmanned aircraft should never be flown near people. Please take precaution not to disturb people's experience, their safety or personal privacy nor the general peace of the protected areas being filmed.
- Flight time should be kept to a minimum and flight should be avoided during the area's busiest times of the day.
- According to Icelandic law it is forbidden to fly close to cliffs where birds nest. An unmanned aircraft should never be flown near animals or birds, neither in nesting areas nor during nesting season or any other seasonal time when animals or bird habitats are considered vulnerable.

- All disturbance to animals and wildlife is strictly prohibited. If the use of unmanned aircraft causes disturbance to wildlife in the area, its use should be ceased at once.
- The conductor of the unmanned aircraft is responsible for the aircraft within the protected area. This includes taking responsibility of any possible risk of harm to people, fauna and nature and leaving no permanent marks on the site in question. Should the aircraft crash, all components from it must be collected and removed from the area. This does not necessarily apply if retrieving the aircraft is dangerous.
- For safety reasons, the conductor of the unmanned aircraft should wear high-visibility clothing, so it is easier to identify that person.
- Unmanned aircraft should take off and land in a safe distance from other visitors according to regulation 990/2017 on unmanned aircrafts.
- The usage of a drone shall be according to regulation no. 990/2017 on the operation of remotely piloted aircraft (www.icetra.is/aviation/drones/).
- Please note that according to the regulation all drones used for commercial flight need to be registered at the Icelandic Transport Authority.

Other conditions

- Off-road driving in Iceland is strictly prohibited.
- The permit holder is required to prevent all disturbance to the environment and make sure that all litter is removed from the sites.

Vatnajökull National Park wishes to receive, free of charge, a copy of all reports and scientific articles that result from the research project.

Vatnajökull National Park can withdraw the permit if conditions of the permit are not complied to.

Best regards,

Sigurður Ó. Jónsson

Sigurður Óskar Jónsson
Assistant park manager
Vatnajökull National Park

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