Referee's comments are in dark blue.

In this 'brief communication', Walter et al. introduce a new technique for (semi-) autonomous high-resolution monitoring of sediment dynamics in remote alpine terrain based on UAV remote sensing and photogrammetry. The presented system consists of a hexacopter and a base station that facilitates automatic recharging and acts as an operational relay between the UAV and a remote operator, who is in charge of the flight monitoring. From a technical and operational point of view, a remote operator would not be necessary within this framework, but supervision by a human is still mandatory for (autonomous) UAV missions beyond visual line of sight. The feasibility of the approach has been successfully demonstrated at the Illgraben debris-flow catchment in Switzerland and paves the way for (semi-)autonomous UAV-based monitoring in other contexts and terrains.

In addition to the comments of Reviewer 1, I have some (rather technical) remarks and questions that might be of interest for some readers:

1) A limited durability and replacement of some system components is mentioned in the text (L93-94). Which components were less reliable or failing and how often had the base station to be serviced during the summer months? The maintenance aspect would be especially important for autonomous operations in even more remote locations where the frequent replacement of components is difficult.

We plan to provide the following explanations (or an abbreviated version thereof): The mentioning of limited durability mostly refers to components which were susceptible to environmental conditions and which needed adaptions or a replacement for more robust versions. One example is the compass, which failed at the beginning of the campaign due to direct sunlight radiation and developing heat and was replaced with a more reliable version. This example shows that more maintenance was necessary in the beginning of the project, compared to the end of the project. Towards the project end, inspections were done about once every two months. In general, the Meteodrone requires maintenance on the motors after 150 flight hours, exchange of the battery after 150 recharging cycles and the parachute after 12 months.

2) Had the remote operator/observer in the control centre in St. Gallen ever to intervene during the three-year period? Has the remote operator/observer full control over the UAV and what would happen in the case of an (unlikely) emergency (e.g. bird attack or curious people/animals approaching the base station during the survey or landing process)? I assume the base station is fenced. Is this correct?

We plan to provide the following explanations (or an abbreviated version thereof): Interventions of the operator were limited to *Abort Missions*, e.g. due to strong wind, or changing weather conditions. The operator has different options to intervene, depending on the situation. In case the UAV is still capable of flight, the operator can abort the mission or return to launch. The operator was also allowed to hold the flight or descent to a safe altitude. In case the UAV is not capable of flight, it is equipped with a parachute rescue system. The rescue system is either launched automatically upon recognition of a problem by the onboard systems or at any time by the operator. This

means also during the starting and landing phase the operator can “kill” the system should it be necessary to prevent harm. The operator can observe the landing and starting site through a surveillance camera, ensuring nobody is in the direct area. We decided against a fenced base station for this project, but this may be appropriate in the future.

3) Can you say anything about the precise and autonomous landing of the copter: is the RTK GNSS in combination with a vision-based tracking system used for this purpose?

We will add the following explanations: For landing, the copter relies on RTK GNSS in combination with an IR and vision-based tracking system.

4) Does the base station rely on an external power supply or is it connected to solar panels and a power station (not shown in Fig. 1)?

We plan to provide the following explanations (or an abbreviated version thereof): In the Illgraben setup, the system was relying on line-current and continuous external power. However, the power could be supplied by other means. An external power generator has been employed before, but so far, no solar panels. A solar-panel battery combination would be feasible.

5) I’m aware that the selected manuscript type has a strict page limit, but I am missing a brief discussion on similar approaches/applications (i.e. semi-autonomous UAV monitoring) in the geosciences.

We will add some text on this question in the introduction (see also comment by Referee 1).

Wording: Unoccupied Aerial Vehicle is increasingly used in the (geo)scientific community as a more neutral term for UAV (Joyce et al., 2021: https://doi.org/10.3390/drones5010021) and I therefore suggest to adopt it.

Thank you for this remark, we will discuss it with the photogrammetry experts of the study and may change the terminology accordingly.