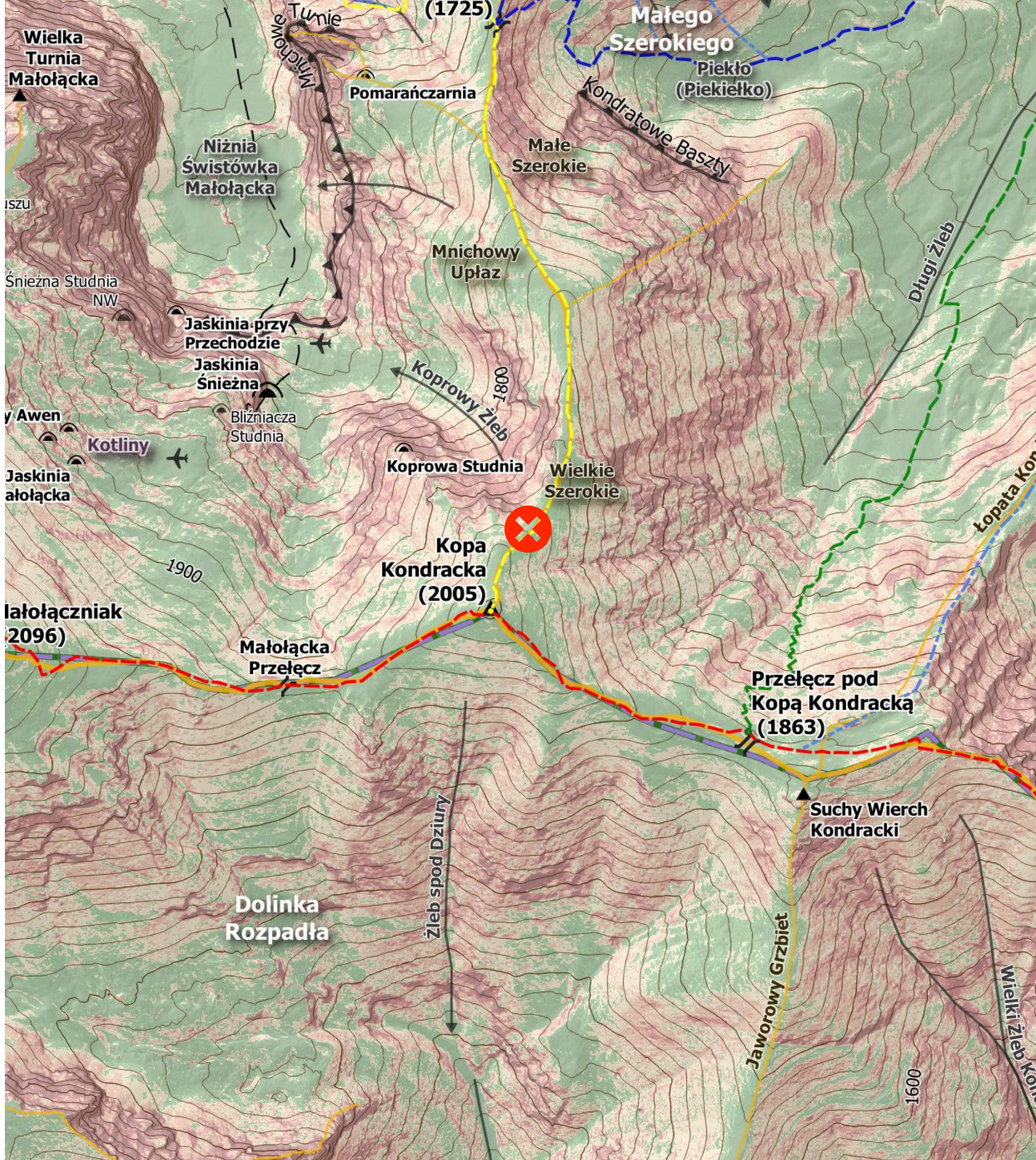
Three Hikers Stuck in Avalanche Terrain

Marcin Józefowicz, Łukasz Migiel, Grzegorz Bargiel, Andrzej Górka, Łukasz Stempek

Keywords: rescue in avalanche danger, decision making, risk management, UAV in mountain rescue,

21 January 2022

- **17:21** TOPR HQ receives a mobile call from a group of **three hikers** (!) who attempted to summit Kopa Kondracka peak (2005 amsl) in Western Tatras,
- the difficult weather conditions have stopped them, they are **poorly equipped**, have **no skills to navigate** themselves back to safety,
- they are able to transmit their position via “Ratunek” app,
- they are stuck in relatively **easy portion of hiking trail** (a popular one in summer), which can become **avalanche endangered** in winter conditions (steep slopes in almost all directions, rounded ridges making loss of orientation more likely),



Czerwone Wierchy massif

steep slopes or rock faces below often rounded, easy ridge

21 January 2022

- 18:35 no further contact with the hikers can be established,
- **two groups of rescuers** (7 + 7) start from TOPR HQ via Hala Kondratowa towards the lost party,
- 21:30 due to high risk of terrestrial rescue (night, blizzard, significant avalanche danger) TOPR UAV team is alerted, **reconnaissance** and perhaps **delivery of some items** is requested,

Tatrzańskie Ochotnicze Pogotowie Ratunkowe
34-500 Zakopane
ul. Piłsudskiego 63a

Szczegółowy komunikat lawinowy TOPR dla Tatr Polskich

Obowiązuje do:	2022-01-22 godz. 20:00
Ogłoszono:	2022-01-21 godz. 17:38

Ogłoszony stopień zagrożenia

Stopień zagrożenia: Znaczny

Przed południem (AM)

Po południu (PM)

Stopień zagrożenia: Znaczny

Pokrywa śnieżna na wielu stromych stokach jest związana umiarkowanie bądź słabo. Wyzwolenie lawiny jest możliwe nawet przy małym obciążeniu dodatkowym, w szczególności na stromych stokach wskazanych w komunikacie lawinowym. W pewnych sytuacjach duże, a w nielicznych przypadkach także bardzo duże lawiny mogą schodzić samoistnie.

Warunki w znacznej mierze niekorzystne. Poruszanie się wymaga bardzo dużego doświadczenia i umiejętności oraz posiadania bardzo dużej zdolności do oceny lokalnego zagrożenia lawinowego. Należy unikać stromych stoków, szczególnie wskazanych w komunikacie lawinowym jako niekorzystnych pod względem wystawy lub wysokości. Konieczne jest zachowanie elementarnych środków bezpieczeństwa.

Historia i tendencja zagrożenia:

2022-01-19 HISTORIA	2022-01-20 HISTORIA	2022-01-21 HISTORIA	2022-01-22	2022-01-23 PROGNOZA
				
2	2	3	3	3

Informacje dodatkowe:

Świeży przewiany śnieg zalega na twardym i b.twardym starym śniegu. W wielu miejscach depozyty śnieżne w postaci poduch i pól śnieżnych. Dalszy prognozowany opad śniegu wraz z wiatrem pogorszy warunki lawinowe. W wielu miejscach depozyty przewianego śniegu przykryte świeżym luźnym śniegiem. Uwaga na znaczne depozyty nawianego śniegu w depresjach, pod ścianami i w rejonie grani.

TURYSTO, TATERNIKU, NARCIARZU!

Komunikat lawinowy jest elementem systemu ostrzegania i zawiera przede wszystkim ogólny opis zagrożenia lawinowego. Informacje zawarte w komunikacie lawinowym stanowią podstawę do własnej oceny użytkownika. Nie zastępują samodzielnej oceny lokalnej sytuacji lawinowej.

Twoje bezpieczeństwo zależy przede wszystkim od Ciebie. Bądź rozważny. Dopasuj swoje plany do aktualnych i prognozowanych warunków w Tatrach oraz do Twoich umiejętności i doświadczenia zimowego.

PAMIĘTAJ, ŻE PRZY ZBYT DUŻYM RYZYKU LAWINOWYM RATOWNICY MOGĄ DOTRZEĆ DO CIEBIE ZA PÓŹNO BY CI POMÓC!

Komunikat wygenerowano z rejestru Komunikatów Lawinowych TOPR.
Data sporządzenia: 2022-01-21 17:38:57. Sporządził: Andrzej Maciata

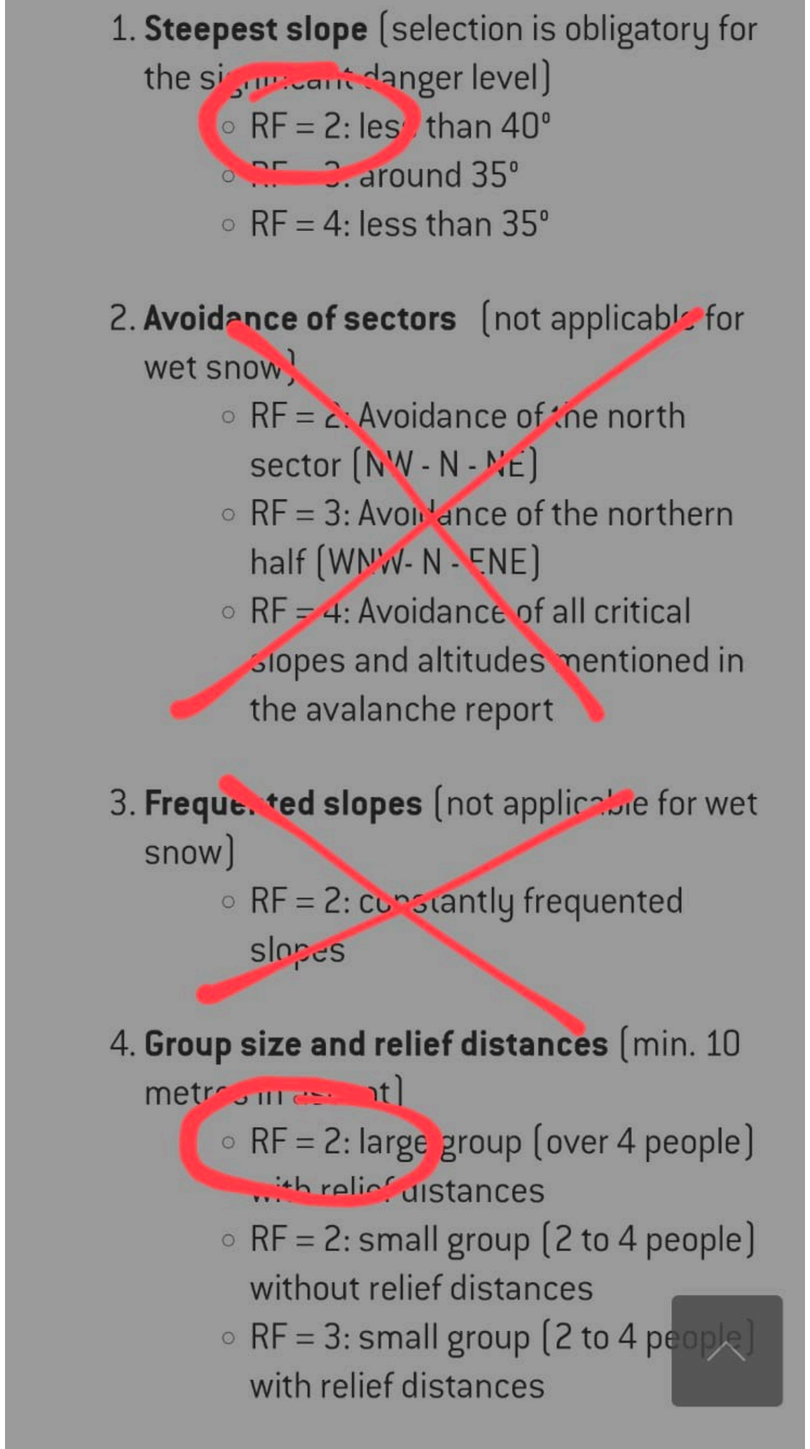
two groups of rescuers set out on skis

21 January 2022

- the conditions the rescuers face become **more dangerous with rising altitude**,
- above the tree line the wind gusts are severe, the **snow is being carried** copiously by the wind,
- the **avalanche danger is increasing**,
- the evaluation of local danger is compromised,

21 January 2022

- **only two criteria from Reduction Method** for mitigating the avalanche danger (reduction factors = 4) can be applied,
- temperature drops to -17°C, the wind on the ridge exceeds 100 km/h,
- the **risk taken by rescuers** (all properly equipped, including avalanche backpacks) appears as overwhelming,
- the **life of three young**, inexperienced, and poorly equipped hikers seems to be even more threatened…



1. **Steepest slope** (selection is obligatory for the significant danger level)
   - RF = 2: less than 40°
   - RF = 3: around 35°
   - RF = 4: less than 35°

2. **Avoidance of sectors** (not applicable for wet snow)
   - RF = 2: Avoidance of the north sector (NW - N - NE)
   - RF = 3: Avoidance of the northern half (WNW- N - ENE)
   - RF = 4: Avoidance of all critical slopes and altitudes mentioned in the avalanche report

3. **Frequented slopes** (not applicable for wet snow)
   - RF = 2: constantly frequented slopes

4. **Group size and relief distances** (min. 10 metres in distance)
   - RF = 2: large group (over 4 people) with relief distances
   - RF = 2: small group (2 to 4 people) without relief distances
   - RF = 3: small group (2 to 4 people) with relief distances

22:21
above the tree line an avalanche occurs

the danger to rescuers becomes palpable

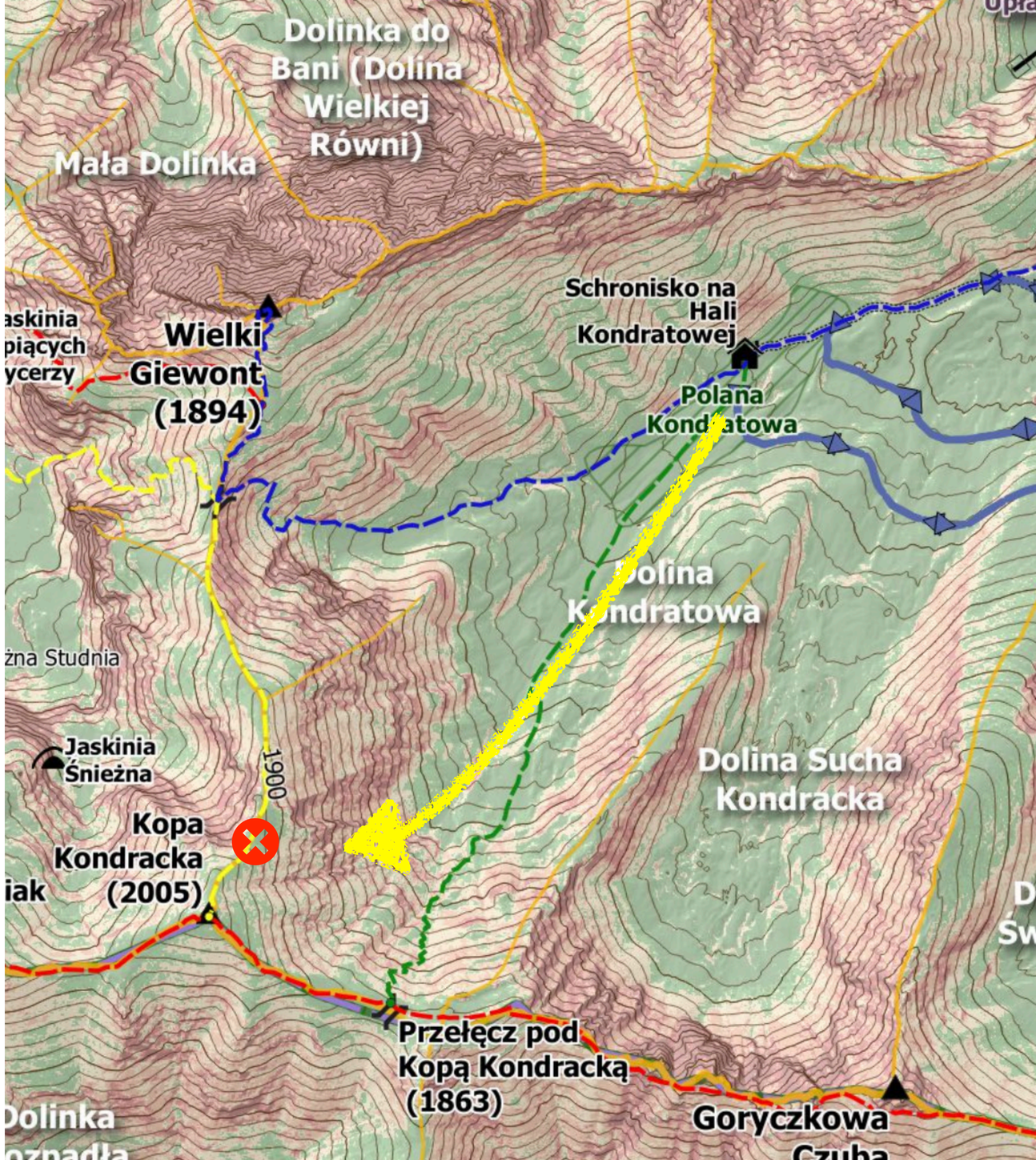
21/22 January 2022

- no one is hurt, still the rescuers decide to **retreat below tree line** to Hala Kondratowa,
- **23:18 TOPR UAV team** sets out towards Hala Kondratowa, their aim is to **locate the the lost party**, and provide them with some **equipment to survive the night,**
- **1:24 first UAV take off** with load of **3 blizzard blankets and 6 heatpacks** (ca 2 kg total),
- no visibility and blizzard make **navigation without visual reference necessary**,
- the coordinates provided by “Ratunek” app are used,

DJI Matrice 300 RTK is used in the mission

22 January 2022

- the first flight ends 300 m before the assumed position of the lost hikers, the wind gusts push the UAV away, UAV returns safely back to Hala Kondratowa,
- 1:44 second flight ends likewise,
- the flights are performed in 20 m/s NW wind (23 m/s is the UAV maximum),
- the conditions are expected to improve, the UAV operators decide to wait out the worst weather,



22 January 2022

- another flight ends in **forced landing in snow** near the hut, the UAV must be checked, all checks are successful,
- 5:39 the M300RTK takes off with package, the flight is achieved with **no visual reference**, onto coordinates on map,
- the lost **hikers are located, alive, the hypothermia prevention package is successfully delivered directly into hands of one of the hikers** *, the UAV returns to Hala Kondratowa,

22 January 2022

- 6:55 another flight with **another package is attempted** (phone, radio transceiver, 1 litre thermos, candy bars, 2 kg in total),
- UAV reaches the lost hikers again, this time the device reports **malfunction** (engine overload, connectivity issues, battery life is significantly reduced < 60%),
- the operators decided to retreat to Hala Kondratowa to avoid crash landing,
- **on the way back the malfunctions intensify, the UAV performs emergency landing from 200 m AGL,** *, the position of the lost UAV is noted,
- the cause was most likely **persistent icing of the rotor blades**,

22 January 2022

- 6:08 **groups of rescuers start on skis**, their goal is to find a safe route to the missing hikers, locate them, and transport back to safety,
- the **reduced wind speed and improved visibility** make the local danger evaluation more feasible,
- the increase in **safety** allows the rescuers to move with **greater ease**,
- the steepest section of the approach (the area of recent avalanche) is protected by ropes,
- above the snow deposits the snow is blown off the ridge

22 January 2022

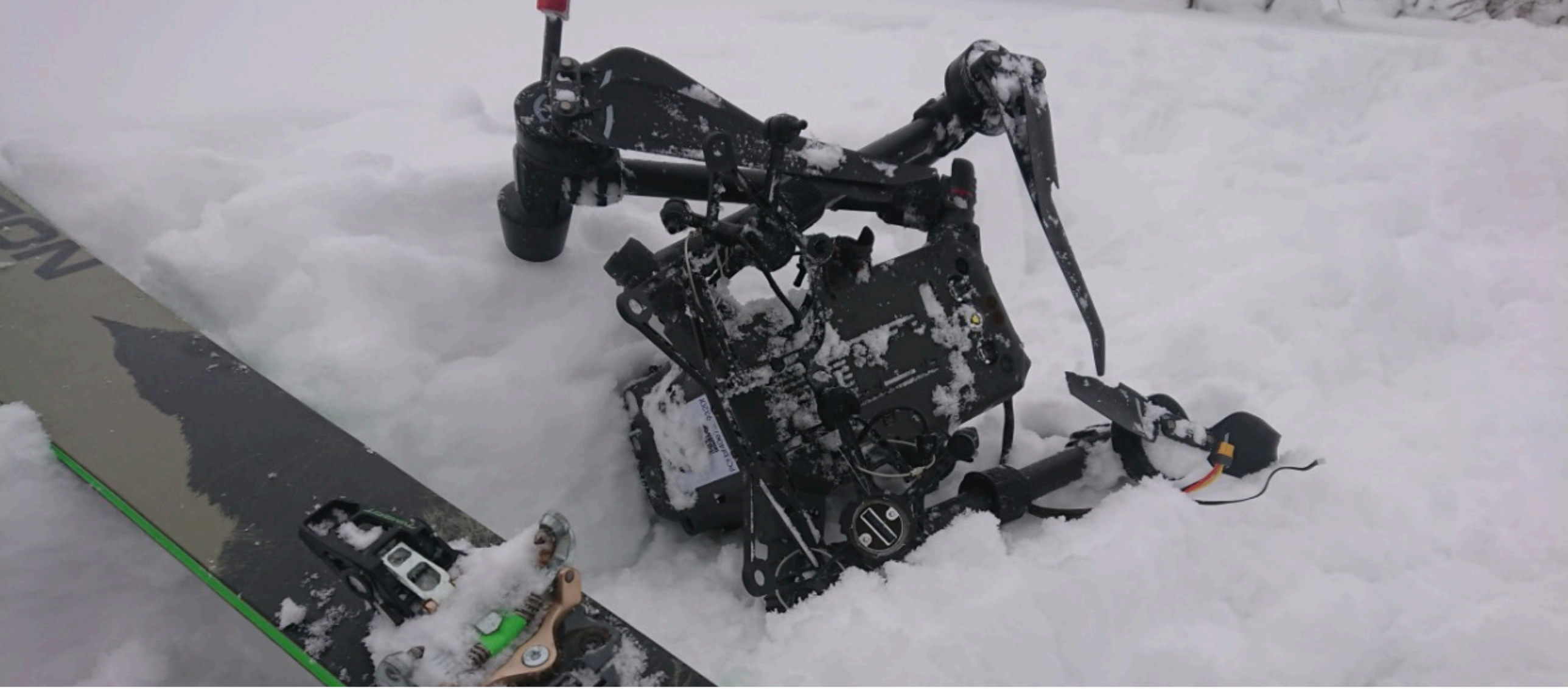
- the snow above tree line in blown off by strong gusts of wind,
- on the ridge the wind makes it difficult to walk *, exceeds 100 km/h again,
- the health of the hikers is much in question,
- the rescue is beyond the reach of helicopter,

11:23

- **the hikers are found bivouacking in the snow, they are exhausted, mildly hypothermic (HT I),**
- in their own opinion **they managed to survive thanks to the thermal blankets and heat packs delivered by UAV**,
- 11:56, after being provided some food and warm drink, they are **able to walk assisted**, they are urged to descend, to leave the worst weather zone,

21-22 January 2022

- **in total 36 rescuers took part in the rescue**, 9 of them “recycled” (worked both night and day shifts),
- some worked as a **safety back-up** for the rescuers directly involved in reaching and accompanying the hikers (e.g. dog handler with a dog),
- the UAV flew **14 flights** prior to emergency landing,
- 15:30 hikers transferred to ED in Zakopane’s hospital (exhausted, minor frostbites to extremities)
- 16:00 all rescuers return to TOPR HQ



M300RTK is eventually found

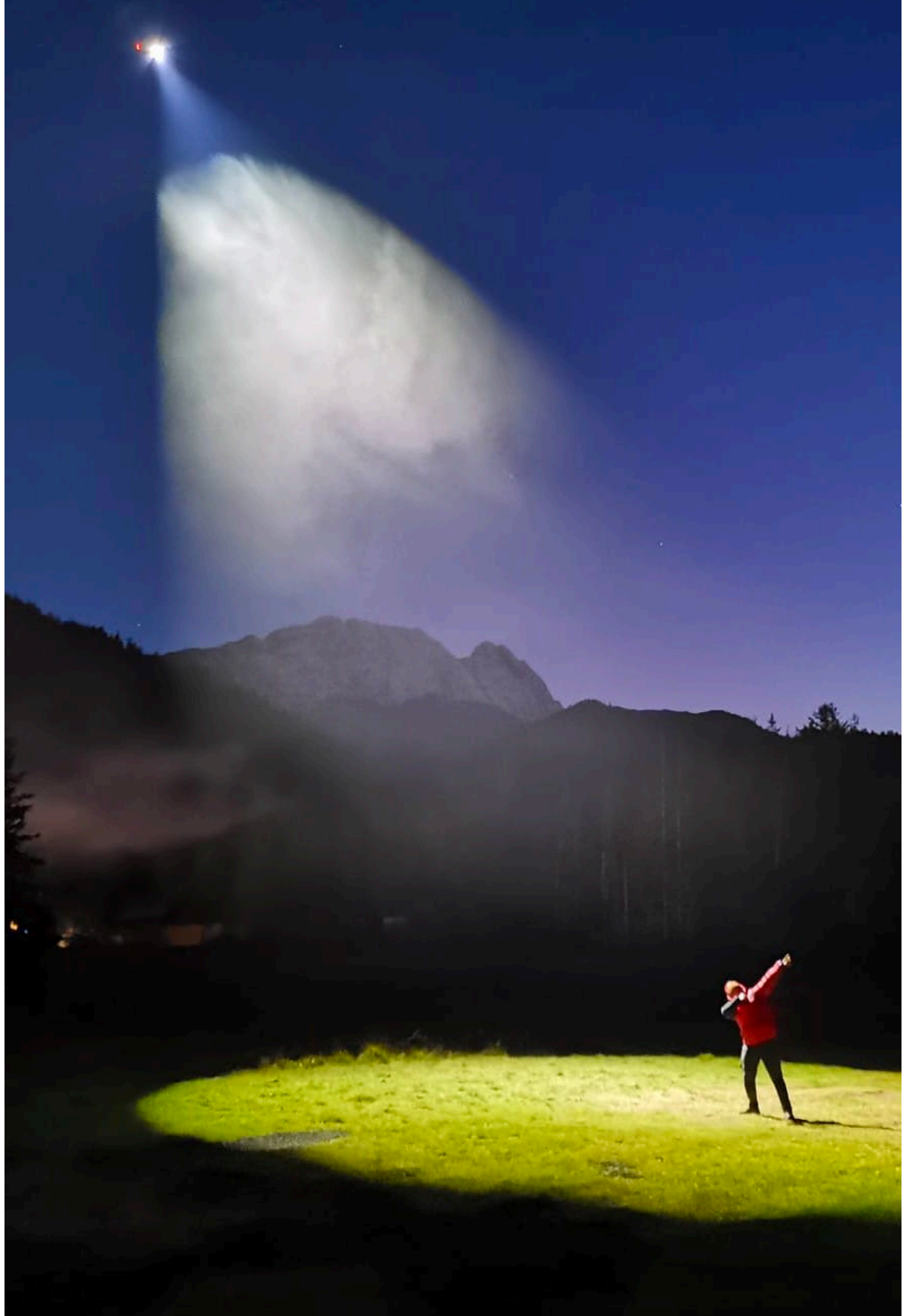
after thorough repair it is **fully operational**

TOPR UAV statistics

- UAVs **currently** used by TOPR:
- DJI Mini 2 (1), Mavic 2 EA (6), Matrice 300 RTK (1), Matrice 30 T (2), Agras T30 (1), **11** in total,
- can carry up to **30-40 kg**,
- **Feb 2021** first trials of UAV in TOPR
- **Jun-Aug 2021** first rescuers trained,
- **Sep 2021** first UAVs purchased,
- **Oct 2021** first rescue mission,

TOPR UAV statistics c-d

- currently 45 rescuers trained to operate UAVs (40 BVLOS),
- total 19 missions with UAV (14 own i 5 external – the Police, HZS)
- total kilometrage (all flights): 3,923 km,
- total air time: 297 h 59 m 36 s
- total flights: 2177



Conclusions

- **safety of rescuers must be a priority**, yet where is the limit?
- too **blurred a line** may mean entering a danger zone to easily,
- in a **team of equals** who makes the decision to continue/abort mission?,
- **after happy end** discussions tend to fade quickly - too quickly?
- importance of debriefing and analysis…

thank you for your attention