



**Presentations Commission for Terrestrial Rescue**  
**Joint session of all commissions**

Place: Toblach, Südtirol  
Date: 21. Oktober 2023  
Time: 08:00  
Present: Delegates of all Commissions  
Chair: Gebhard Barbisch, Kirk Mauthner  
Minutes: Fabienne Jelk

**High Altitude Rescue Paper – Development session – Kyle McLaughlin/MedCom**

First shows a rescue mission on Mount Logan at 5959 m above sea level.

People who are not acclimatized run the risk of suffering from altitude sickness from an altitude of 2500 m above sea level. Prophylactic treatment with Acetazolamide is recommended for high-risk patients. The exact dose that can be recommended at altitudes above 5000 m has not yet been researched. In high-risk situations such as rescue operations, where people are flown to an altitude of over 3500 m and have to become physically active immediately, the administration of 4 mg Dexamethasone every 6 hours is recommended. However, this should be limited to these situations.

Rescues above an altitude of 3500 m are more complex (physically, psychologically, weather). The rescuers have different skills, the rescue teams have different resources and the rescue operations are conducted inconsistently. There are no recommendations. Today, more people are traveling at high altitudes and the demands on a rescue are becoming ever greater. The technology is constantly being improved.

A High Altitude Rescue Paper was developed. Various people from MEDCOM, AIRCOM, TERCOM, mountaineers, pilots and mountain guides from 10 countries were involved. This was decided at the ICAR in Montreux in 2022, and a rough draft has been available since September 2023.

Rescues at very high altitudes are those between 3500 m and 5500 m above sea level; extremely high altitudes are those above 5500 m above sea level.

Various points are discussed and dealt with in the paper: Pathophysiology (pathologically altered body functions) in rescuers at high altitudes, terrestrial rescue (improvised and organized rescue, strategies in mixed teams of organized and improvised rescue, supplemental oxygen, rescuer safety checklist).

The following questions remain unanswered with regard to terrestrial rescue:

- Additional oxygen for rescuers during rapid ascent?
- Prophylactic medication for rescuers during rapid ascent?

First recommendation for terrestrial rescue:

- Recognizing the differences between organized, improvised and mixed rescue teams.
- Recognizing the strengths and limitations of teams.
- Publication of a «Rescuer safety checklist».

Shimanski Charley talks about helicopter rescue at high altitudes. First recommendations:

- Reduce exposure time.
- Assessment in front of the flight and a checklist.
- Weight limitation of helicopter and crew.
- Have a plan B in case you can not fly anymore.
- Special training for those rescues.
- Additional oxygen for pilots and rescuers when flying above 3000 to 4000 m for a duration of more than 30 minutes (regardless of acclimatization).
- Additional oxygen for all pilots and rescuers on flights over 4000 m regardless of duration. Pilots should preferably be acclimatized.

Open questions:

- Prophylactic medication should be given to non-acclimatized pilots and rescuers during rapid ascents?
- Should the duration of the stay at high altitudes be limited after a rapid ascent? How long?
- Should the time the rescuers spend outside the helicopter be limited? How long?
- Pilots and rescuers should have medication for altitude sickness in their survival kit in case there is a problem with the helicopter and they can no longer be flown out?

Medical Part:

The following points were discussed: Barometric and non-barometric effects of high altitudes on medical equipment and medications, medical care, equipment and skills at high altitudes, expected medical conditions at these altitudes.

Initial recommendations were made on the effects of high altitudes on medical equipment and medication, checklist for patient care at very high altitudes.

Open questions:

- Further testing of the effects of low air pressure, low oxygen, cold temperatures, high UV exposure and low humidity on medical equipment and medication.
- Further improvement of medical knowledge and skills to carry out medical treatment at high altitudes.

Philosophical and ethical aspects were also discussed. Initial recommendations were made:

When discussing ethical aspects of a rescue mission, the four principles of biomedical ethics should be taken into account:

1. respect for autonomy (patient's right to self-determination)
2. care/well-being
3. Do not harm
4. justice

A first draft of the paper exists in October 2023. It is divided into the chapters "Rescuer Safety at very high altitude" and "Medical Care in very high altitude". A further division could be made into the chapters "History of Helicopter Rescue at High Altitude" and "ICAR Position Paper for Rescue at High Altitude».

How should the paper be published? The following options are available:

1. ICAR-Recommendation
2. HAMB, WEMJ & AirMed & Rescue
3. Special edition or series in HAMB
4. Manual or book

Further points for discussion: Inclusion of UIAA / ISMM

Further information will be available in Thessaloniki.

For questions: [Kyle-mclaughlin@me.com](mailto:Kyle-mclaughlin@me.com)

*File: 20231021-20-Rescue-at-VHA.pdf*

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### **Interdisciplinary Drone Workgroup (IDWG) Report out of the practical day and the discussion during the conference - Will Smith / Chair of IDWG**

How can conflicts with drones in search and rescue operations be avoided?

The IDWG was formed in 2020 and consists of the following members: Will Sith is the chair, Diarmaid Scully and Matt Ellingham are from AIRCOM, Claudio Artoni

and Mark Hebison are from AVACOM, Peter Paal and Giacomo Strapozzon are from MEDCOM and Filip Biocic and Martin Gurdet are from TERCOM.

How can drone pilots avoid conflicts with manned aircraft such as helicopters, with other drones, with other flying objects such as birds and with other obstacles such as power lines and trees?

The topic was also covered on the practical day on October 18, 2023.

One topic is communication:

- Active communication via radio (own frequency for air operations) and communication from the air traffic coordinator as well as passive communication (ADS-B, FLARM etc., these must be standardized). Well-functioning communication is essential.
- Crew Resource Management: 2 to 3 team members are needed for a fully functioning drone team, trust between pilots, cooperation, coordination and practice are important.
- A flight plan must be drawn up: Create geo-fences, define where the drone will fly and where the helicopter/manned aircraft will fly. This space is defined horizontally and vertically. The flight space of the drone and helicopter is separated. A plan must be drawn up in the event that communication is lost and the flight space is occupied, in which case the drone will land immediately.

What is missed:

- Airspace Commander, who is responsible for nothing other than communication and organization.

What are the next steps: Strategic and tactical UAS operations, planning, creating checklists, determining qualifications.

A paper is also to be published: "Current Status of use of Uncrewed Aerial Systems (UAS)/Drones in Search and Rescue - a scoping review).

*File: 20231021-21-IDWG Congress presentation pdf slides.pdf*

## **What are the ICAR community expectations regarding the popping up of new technologies-based tools? Summary of our Workshop and Panel Discussion (Renauld Guilermet / AIRCOM)**

Group from France: Technologies are constantly growing and are part of our lives. Rescue by helicopter has been greatly advanced in the last 66 years.

The topics were dealt with in Workshop 1 on the practical day. 77 delegates took part, 3 working groups, and a paper is to be published: "Current Status of use of Uncrewed Aerial Systems (UAS)/Drones in Search and Rescue - a scoping review".

### WG 1: Technology and Rotorblade Visualization

Rotorblade-impact: 100 percent have already experienced it. 50% horizontal, 50% vertical.

OPS limitation: pretty bad, SOP's: seems to be ok.

Results of WG 1:

- A technology-based solution must be found. This technology must be customized, a head-up concept and 100% reliable.
- Development of a standardized procedure (SOP, Standard Operation Procedure) and training is the first step to achieving safety.

### WG 2: Tracking and localizing prior to rescuing (Tracking und Lokalisierung vor der Rettung)

Results of WG 2:

- Key points: Cooperation with manufacturers is important. This can be initiated by the emergency services or the manufacturers. These are more than open for that..

Correct use of the tools. All rescuers must be familiar with the new technical systems and be able to use them.

The tools must provide rescuers with contextual data related to the activity that the rescued person was performing. All rescuers who carry out operations in the field must be proficient in the use of the new technical systems.

- ICAR should draw up a list of the most important information that these tools should provide. Draw up a list of the information that the tools should provide to rescuers

Don't forget to work together with the operations centers. You have think about where the emergency calls from these tracking tools go.

Proposals to the Executive Board:

- Set up a ICAR working group: "Tracking and localizing prior to rescuing".
- Organize a meeting between ICAR and manufacturers during the congress 2023.
- Get in touch with the UIAA Safecom.
- The technical commissions should be ready with a list of all Geolog-Apps next year..

Questions / Comments:

Gebhard Barbisch: Where does the alarm that is triggered by these tools go? In Austria, the alarm goes to airspace surveillance. You have to think about that.

Delegate: The people who have such a tool (tracking and localization) must know what kind of device it is. Likewise, the family and friends of this person must know that this person has such a device, what kind of device it is and that the person can be found with it.

The support of the technologies must be taken into account. There should be support for all technologies.

There must be a minimum standard for these technologies. There is a recommendation from AVACOM: Be Searchable. This must be adapted and discussed in all commissions.

*File: 20231021-22-Renaud ICAR 2023 AIRCOM WS .pdf*

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## **Mountain Rescue on Fire?! – Stefan Blochum – Bergwacht Bayern (TERCOM)**

Shows the challenges faced by mountain rescuers in forest fire operations.

The core tasks of rescuers during fires in rough terrain are regulated by Art. 17 of the Bavarian Rescue Service Act and also guaranteed by disaster control.

In the years 2020 to 2023, the number of operations involving fire increased massively. An example of such a fire is the fire in Brig this year. A video of this fire is shown.

Why should fires in the terrain be fought at all? The fire in Leuk in 2003 had a major negative impact on the landscape. Landslides are on the increase. Intact forests are vital.

In Austria, Reichenau/Mittagsstein, there was a fire on 28.10.2021.

Special equipment is needed to fight the fires. The equipment used by the fire department does not meet the requirements for mountain rescue. The BWB uses the following material for operations involving fire, which must be fireproof. Aramid slings and ropes. Automatic belay devices (self-breaking devices) and 2 m metal strops are also used.

The risk of rescuers falling must be taken into account. There is also a risk of falling rocks. Escape routes must be defined in every fire.

Special Operation Trailer: This is where the operation is organized.

Conclusions for rescue organizations:

- The usual equipment for mountain rescues cannot be used to fight fires. Special equipment is required.
- Use of knowhow and tactics of fire brigades.
- A good risk management is essential and demanding.
- Special consulting is necessary .
- There are more and more fires, partly due to climate change. We have to deal with that. Cooperation between the fire department and mountain rescuers is important.



Files:

20231021-23a-ICAR Vegetationsbrand\_V2.0.pdf

20231021-23b-Bild1.jpg

20231021-23c-Vegetationsbrand Wallis Brig.mov

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## **Mountain Events in Hot weather – John Ellerton / MedCom & Darryl Macias / UNM-IMMC**

The average temperature on earth is constantly rising. Glaciers are melting, etc.. This has an impact on the human body, which is also reflected in mountain rescue.

Heat illness occurs when the body temperature rises above 37.5 degrees. This can happen not only due to the ambient temperature, but also due to the work of the muscles during exertion. The most common heat illnesses are heat exhaustion and heat stroke. In heat stroke, the patient's core temperature is higher than 40 degrees. This leads to brain dysfunctions such as confusion, reduced consciousness, coma, seizures and ultimately death. These symptoms do not occur with heat exhaustion. It manifests itself as fatigue and headaches with normal consciousness.

Heat illness can occur not only in hot places. Brecon Beacons in Wales is shown as an example. In 2013, three people died there during a 26 km military march. The route, clothing and equipment caused them to die of heatstroke.

Rescuers can also suffer from heat illness. They are exposed to similar stress as soldiers..

There are also always fatalities in races, e.g. 14 deaths in the Great North Run in the 42 editions, 4 of them in 2005 alone. At the time, overexertion was assumed to be the cause of death. The temperature during the race was 18 degrees. In 2005, a study was carried out at this race, which showed that 55 runners with a core body temperature higher than 41 degrees were taken to hospital rectally. It was not initially recognized that the runners died of heat stroke in 2005.

Heat illnesses are therefore not always recognized immediately. A temperature measurement should therefore be carried out as soon as possible on any patient

with impaired consciousness. Heat-related illnesses are usually thought of in hot temperatures, but the influence of excessively warm clothing on ski tours, for example, should not be forgotten.

Heat-related illnesses include heat oedema, heat rash, heat cramps, heat syncope, heat exhaustion, electrolyte and glycogen deficiency, heat stroke (over 40 degrees core body temperature). Heat stroke: 40 degrees Celsius + end organ.

*There are various methods of measuring core body temperature. A new device has been developed that can be placed in the ear and measures temperature, oxygen saturation and other parameters.*

*Heat exhaustion shows a normal mental status. These patients can be moved to a cool, shady place or sprayed with cool, lukewarm water. They can be given electrolytes and fluids to drink.*

*Heat stroke requires immediate cooling and rapid evacuation.*

*Questions/comments*

*What can be used for cooling?*

*You can use whatever you have to cool a body: Ice, water.*

*File: 20231021-24-Mountain Events in Hot Weather.pdf*

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### **Complex Rescue from Glacier des Bosson – Implications of Climate Change – P. Boric FrenchGroup (TERCOM)**

The PGHM consists of 20 rescue units.

The glaciers have receded massively since 1864.

An extraordinary rescue from a crevasse is shown. It was a rescue in unstable terrain, in a glacier collapse. The victim was buried under blocks of ice.

The alarm was raised at 3.26 p.m. in the afternoon. The accident site was near the Cabane des Grands Mulets. The rescuers were dispatched to the scene of

the accident at 3.38 pm. Visual contact was made with the victim. There was a risk of snow and blocks of ice falling on the victim. The victim spoke German. The last block was removed at 6.40 pm. The victim was evacuated at 7.30 pm. The rescue operation was over at 9.45 pm.

The rescue operation was very difficult and the rescue was carried out under great pressure. The victim's life was in danger from the blocks of ice, which could have fallen on him at any time. There was a great deal of uncertainty during the operation, it was already late in the evening and the weather had to be taken into account. The equipment was used to the limit. Great tensile forces acted on the material. The victim was trapped under blocks of ice. 4 large blocks had to be removed. Everything was unstable. .

What was used for safety: a monitoring system (Alarm Telemeter), an anti-collapse system (Stable Bag), hydraulic cylinder.

What additional equipment was used: A chain hoist, helicopter for heavy loads, mooring for granite blocks, plastic wedges, hydraulic spreaders, micro-blasting, portable hydraulic generator electric/manual..

*File: 20231021-25-the Complex Rescue from Glacier des Bossons.pdf*

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### **Marmolata Glacier Accident – Simon Rauch and Giacomo Strapazon / MedCom** (Sorry – no presentation available)

The glacier collapse occurred on July 3, 2022, resulting in 11 deaths and 7 injuries. The collapse took place via the normal route to Punta Penia. The conditions on the Marmolada have changed massively in recent years due to global warming. Temperatures have risen steadily.

The causes of the collapse are still being investigated. The probable cause is the presence of liquid water (meltwater) that penetrated between the crevasses and a water infiltration that acted as a sliding layer between the ice and the rock. The formation of a water pocket increased the pressure between the crevasses and the ice base, which led to further destabilization of the ice. This

water pocket, which could not drain away, was probably the main cause of the glacier collapse.

Various helicopter companies were involved in the rescue (Helibase Trento, Helibase Bressanona, Helibase Pieve di Cadore).

The difficulty was that several patients had to be treated. A triage had to be carried out.

For safety reasons, HEMS (Helicopter Emergency Medical Service) flights were eventually stopped and drones were used.

How can such events be managed?

1. Safety of rescuers has the highest priority.
2. The first measures should be aimed at creating a command and control structure. Triage and life-saving and life-prolonging measures are then initiated.
3. The coordination of helicopters and drones in the same airspace is extremely imp.
4. Leadership and communication is essential.
5. Evacuation of patients to the best suitable hospitals.
6. Tools, to locate and identify victims should be available.
7. Planning and training are necessary.
8. Learning from experience.

One might ask whether a working group is needed to deal with the effects of climate change.

End of this meeting: 12.00