REGISTERING AVALANCHE ACCIDENTS IN EUROPE IN THE FRAMEWORK OF EAWS

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ABSTRACT: The main objective of the European Avalanche Warning Services (EAWS) is to prevent loss of lives and damages due to avalanches. Considering that a clear picture of accidentology can help, EAWS is building a database of individual avalanche fatalities in Europe dating back to 2018/2019 season but also historical series without details (https://www.avalanches.org/fatalities/). The website provides figures for the general public in near real-time as well as some statistics (https://www.avalanches.org/fatalities/fatalities-statistics/).
A working group was formed at the 2023 General Assembly to work on the parameters to be collected and common definition for these parameters. This group is also considering links with other entities dealing with accidentology such as ICAR (International Commission for Alpine Rescue).

KEYWORDS: avalanche accident, database, fatalities, standard

1. INTRODUCTION

The primary purpose of the European Avalanche Warning Services (EAWS) is to support its members in preventing loss of life and damage due to avalanches by providing society with efficient and effective avalanche forecasting and warning services. To foster this goal, EAWS is developing standards, guidelines and recommendations. It is in this framework that the 2023 General Assembly has launched a working group on avalanche accidents. This working group has three goals, first to ensure a European, near real time data collection on avalanche fatalities, second, to improve the way of presenting that data, and finally to harmonize the documentation of avalanche accidents across Europe to allow better statistical analysis.

Analysing avalanche accidents is one of the ways by which the AWS has set up and still improve the various tools they use to communicate avalanche danger to their various users (e.g. Jamieson et Johnston (1992), McClung (2000)) even if it is only one way among others (St. Clair et Haegeli, 2023). However, the existing avalanche accident databases are often national and the study of characteristics on a European scale is made difficult by the non-homogeneity of the fields and/or definitions used by each of the organization. As a result, the rare cross-national studies are generally limited to the simplest observed parameters as number of fatalities, and some simple terrain characteristics as slope and orientation e.g. Greene et al. (2006), Techel et al. (2016), Pfeifer et al. (2018), Reuter et al (2023).

Finally, the number of avalanche fatalities per year due to snow avalanches is estimated to be about 250 worldwide (Acharya et al., 2023). With more than 100 fatalities a year, Europe accounts for more than a third of global avalanche fatalities. Thus, for fatal accidents alone, for which completeness is achieved, a critical number is reached by considering all the EAWS countries, which makes it possible to fill in the gaps in the relatively small samples country by country. On the other hand, there remains the problem of the non-completeness and non-representativeness of non-fatal accidents, because those that are reported are biased (either rescued by professionals, or by people with a good knowledge of avalanches, or by users of social networks, etc, etc).

The aim of this article is to present the data already made available to the public, which currently only concerns fatalities as well as the work in progress on the development of EAWS recommendations for the collection of information on avalanche accidents.

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2. BACKGROUND

EAWS has been building a database of individual avalanche accidents since the 2018/2019 season from an initial project designed and developed together with the new EAWS website after the decision taken at the GA at Oslo (June 2019). The database is filled in in near-real time during the winter season, with a minimum update asked every Monday of the fatalities. Currently, AWS are asked to enter fatal accidents, although it is possible and even advisable to enter all accidents.

Prior to 2018/2019, a collection of historical series of the number of fatalities per hydrological year and per country is currently conducted, but with a reduced subset of parameters (only divided into the three terrain categories "controlled", "uncontrolled" and "unknown").

However, after several/ seven years of using the database's initial fields, it has become apparent that they could benefit from some updates. Not only are there a few points that that are no longer entirely satisfactory, but it's also important to consider the growing role of the social sciences in understanding and using this type of accident database.

3. CONTENTS OF AVALANCHES.ORG FATALITIES WEBPAGE

The website provides information on fatal accidents for the general public in near-real time for the current season (see Figure 1), as well as statistics on the total depth of the archive (see Figure 2).

3.1 Contents of near-real time annual fatalities webpage

The details displayed for each accident are a subset of the entries of the database. As these are likely to change, work is already planned to transfer the 7 years already documented into the new framework

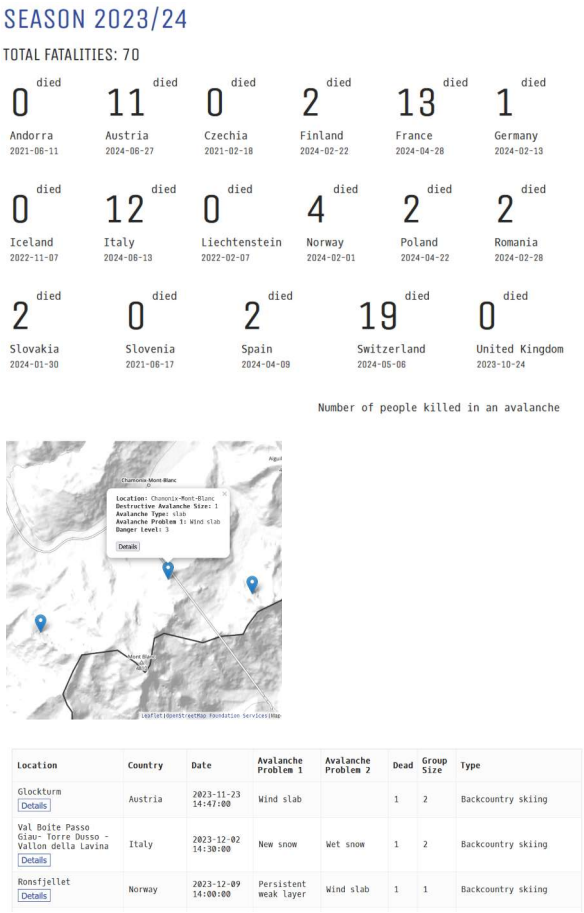

Figure 1: Illustrations taken from the "fatalities" page of the EAWS website for the current season : season count of fatalities, table with details for each accident and location on a map. Screenshots taken on 2024/07/11.

3.2 Contents of fatalities statistics webpage

Users can consult the data by selecting the period, countries and stacking (e.g. avalanche problem, hazard index, controlled/uncontrolled terrain). The readability of the depth of the archives, which differs from one country to another, is one of the points to be improved in the presentation of data so that they can be easily and directly exploited.

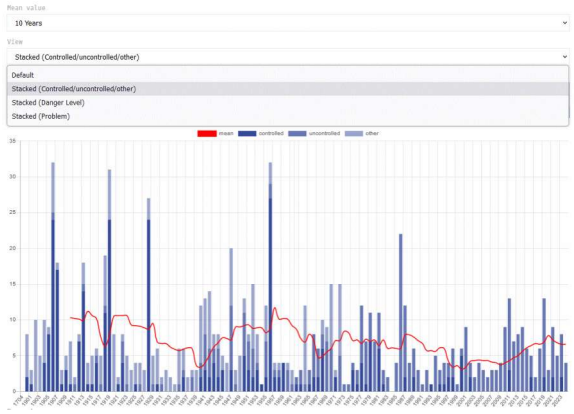

Figure 2: Illustration taken from the "statistics fatalities" page of the EAWS website : Screenshots taken on 2024/07/11. Historical data for Norway highlighting the controlled/uncontrolled ratio with annual data as bars and 10 years-mean in red line.

4. WORK IN PROGRESS OF EAWS RECOMMENDATIONS FOR THE COLLECTION OF INFORMATION ON AVALANCHE ACCIDENTS

Only avalanches with damage to persons are focused on. Avalanches with other damages, e.g. material, economic or to the ecosystem are not covered by this on-going work.

As AWS, the focus is on the location of the accident, the description of the avalanche itself including the triggering processes as well as the associated daily operational avalanche bulletin and any other communications issued by the AWS. To easily cross-reference the different existing sources of data on avalanche accident (like rescue parameters)

It wasn't always easy to decide how far to go into the details while keeping a reasonable filling-in-time: a lesson in compromise…

4.1 Methodology

All EAWS members were asked in autumn 2022 both the fields they are collecting on avalanche accidents themselves but also connected avalanche institutions (rescue teams for instance) and the associated definitions.

The final set of entries in the database is a concatenation of all these fields; the entries retained are those considered to be part of the expertise and core business of AWS.

Each entry in the database has a definition; in the event of discrepancies between the definitions of the various institutions for the same entry, the majority proposal was often retained.

Particular attention has been paid to new fields (some of which are still in their infancy), linked to the increased importance attached to the social sciences in recent years.

4.2 Summer 2024 state

The information is structured as following (final order is not decided yet) :

- Basic data of the avalanche
- Characteristics of the avalanche
- Geographical data of the avalanche
- Starting zone
- Track and Deposit zone
- Groups
- Victims
- Avalanche danger description
- Links with other databases.

The detailed fields are presented in Appendix A.

4.3 Next steps

A benchmark study with North American standards will also be conducted (Logan and Atkins (1996), Boyd et al., (2009), Jamieson (2000)).

The first version, amended with the North American benchmark and the discussions during ISSW 2024, will be presented at the EAWS extended TAB online Meeting in October 2024 for an implementation for winter 2024/2025. The goal is to reach a new EAWS fatality recommendation at the general assembly in 2025.

5. CONCLUSIONS

The EAWS working group “fatalities” is currently working on a European standard for all the parameters that should be collected regarding avalanche accidents, including definitions. The aim is to facilitate the retrieval and analysis of a much larger data set in the future, across borders, for research and operational purposes, but also for the general public via the avalanches.org website.

ACKNOWLEDGEMENT

We are grateful to all EAWS members who have contributed to the near-real time database since the 2017/2018 season on a weekly basis as well as historical data since 1970.

We also would like to thank Jil Christin Lehnert who contributed to the comparative analysis of existing parameters across EAWS countries and the development of the set of parameters presented here.

APPENDIX 2024 WORK IN PROGRESS DETAILS

Here are the detailed fields, hashtags point fields that are secondary specifications and relate to another father field:

Basic data of the avalanche

Date of triggering

Time of triggering

Accuracy of date and time of triggering

Source of information

Characteristics of the avalanche

Avalanche specification

Avalanche length

Avalanche width (only for slab, glide av.)

Avalanche size

Snowpack

Weak layer location

Relevant avalanche problem

Type of grain in the weak layer – in cases with slab avalanches

Triggering

Trigger type

#Trigger type person detail (only apply if trigger type = “person”)

#Trigger type vehicle detail

#Trigger type explosives detail (only apply if trigger type = “preventing control”)

Remote triggering

Geographical data of the avalanche

Country

Town

Peak/Mountain range

Coordinates

Accuracy of coordinates

Starting zone

Starting zone

Fracture line

Elevation of the starting zone

Gradient of the starting zone

Aspect of the starting zone

Terrain of the starting zone

Height of fracture line

Avalanche moisture

Track and Deposit zone

Deposit height

Comment on the volume of the deposit

Debris

Debris type

Debris density

Avalanche moisture in deposit zone

Terrain

Terrain trap

Terrain trap type

Avalanche stepped down into old snow layers

Sliding surface

Groups

Group size

One or more groups

Leaded group/guided group

Group leader qualification

Victims

Number of fatal(s)

Number of injured

Number of caught

Degree of burial

Rescued by

Rescue devices type

Personal information

Local or visiting

#Necessary only for free terrain

#Free terrain activity

#Travel direction just before avalanche :

#Rescue/safety equipment carried

#Knowledge of the area

#Experienced in avalanche terrain

#Necessary only for secured terrain

#Location type of secured terrain:

#Open? Commissioned?

##travel type on street

##travel type in ski area

Avalanche danger description

Accident outside forecast areas

Avalanche danger level/rating

Name of the avalanche region

Other Avalanche warning

Avalanche problem as EAWS defined

Forecast avalanche problem 1

Weak layer

Forecast avalanche problem 2

Weak layer

Forecast avalanche problem 3

Weak layer

Links with other databases

Link with other avalanche databases

Other databases and avalanche id related

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