

Snow avalanche data Davos, Switzerland, 1999-2019

These data include all avalanches that were mapped in the region of Davos, Switzerland during the winters 1998-1999 to 2018-2019 (21 years), in total 13,918 avalanches (see Figure A in the Supplement of Schweizer et al., 2020), and the corresponding forecast regional danger level (public bulletin issued by SLF) valid on the day of avalanche occurrence, 3533 days and danger ratings in total.

This avalanche activity data set was analysed and results published by Schweizer et al. (2020). They found that the number of avalanches per day strongly increased with increasing danger level, but avalanche size was poorly related to avalanche danger level.

The data are provided in two files: the first ("snow_avalanche_data.csv") includes the avalanche data (13,918 records); the second ("avalanche_activity_data.csv") includes the avalanche activity per day (3533 records).

These data are the basis of the following publication: Schweizer, J., Mitterer, C., Techel, F., Stoffel, A. and Reuter, B., 2020. On the relation between avalanche occurrence and avalanche danger level. The Cryosphere, 14, xxx-yyy, <https://doi.org/10.5194/tc-14-xxx-2020>.

In the following we describe the data in the two files column by column.

Snow avalanche data ("snow_avalanche_data.csv")

Column no.	Variable name	Description
1	no	Avalanche number
2	date_release	Date of release
3	snow_type	Type of snow: dry, wet, mixed, unknown
4	trigger_type	Type of trigger: HUMAN, NATURAL, EXPLOSIVE, UNKNOWN
5	max_elevation_m	Maximum elevation (in m)
6	min_elevation_m	Minimum elevation (in m)
7	aspect_degrees	Aspect (in degrees)
8	length_m	Avalanche length (in m)
9	width_m	Avalanche width (in m)
10	perimeter_length_m	Avalanche perimeter (in m)
11	area_m2	Avalanche area (in m ²)
12	aval_size_class	Avalanche size class (1 to 5)
13	weight_AAI	Avalanche weight for calculating the avalanche activity index (AAI). Weights are for Size1: 0.01; Size2: 0.1; Size3: 1; Size4 and Size5: 10.
14	max.danger.corr	Max danger level per day (1 to 5), corrected (as described in Schweizer et al. (2020)). If a danger level for dry-snow and wet-snow were forecast, the higher value is provided.

Avalanche activity data (“avalanche_activity_data.csv”)

Column no.	Variable name	Description
1	date	Date
2	year	Year of winter, e.g. 2011-2012 is given as 2012
3	max.danger.corr	Max danger level per day, corrected (as described in the supplement). If a danger level for dry-snow and wet-snow were forecast, the higher value is provided.
4	AAI_all	Avalanche activity index, including all avalanches regardless of type of triggering and snow conditions. Weighted sum according to trigger. Weights are 1 for natural avalanches, 0.5 for human-triggered avalanches, 0.2 for explosive-controlled avalanches, and 0.81 for avalanches of unknown trigger type.
5	AAI_all.NATURAL	Avalanche activity index, including only natural avalanches.
6	AAI_all.UNKOWN	Avalanche activity index, including only avalanches of unknown trigger type.
7	AAI_all.HUMAN	The avalanche activity index, including only human-triggered avalanches.
8	AAI_all.EXPLO	The avalanche activity index, including only explosive-controlled avalanches.
9	AAI_all.mixed	The avalanche activity index, including all mixed-snow avalanches.
10	AAI.mixed.HUMAN	The avalanche activity index, all mixed-snow avalanches, human-triggered only.
11	AAI.mixed.NATURAL	The avalanche activity index, all mixed-snow avalanches, naturals only.
12	AAI.mixed.EXPLO	The avalanche activity index, all mixed-snow avalanches, explosive-controlled only.
13	AAI.mixed.UNKNOWN	The avalanche activity index, all mixed-snow avalanches, unknown trigger type only.
14	AAI_all.wet	The avalanche activity index, including all wet-snow avalanches.
15	AAI.wet.HUMAN	The avalanche activity index, all wet-snow avalanches, human triggered only.
16	AAI.wet.NATURAL	The avalanche activity index, all wet-snow avalanches, naturals only.
17	AAI.wet.EXPLO	The avalanche activity index, all wet-snow avalanches, explosive-controlled only.
18	AAI.wet.UNKNOWN	The avalanche activity index, all wet-snow avalanches, unknown trigger type only.

19	AAI_all.dry	The avalanche activity index, including all dry-snow avalanches.
20	AAI.dry.HUMAN	The avalanche activity index, all dry-snow avalanches, human-triggered only.
21	AAI.dry.NATURAL	The avalanche activity index, all dry-snow avalanches, naturals only
22	AAI.dry.EXPLO	The avalanche activity index, all dry-snow avalanches, explosive-controlled only.
23	AAI.dry.UNKNOWN	The avalanche activity index, all dry-snow avalanches, unknown trigger type only.
24	AAI_all.unknown	The avalanche activity index, including all snow avalanches of unknown snow type.
25	AAI.unknown.HUMAN	The avalanche activity index, all snow avalanches of unknown snow type, human triggered only.
26	AAI.unknown.NATURAL	The avalanche activity index, all snow avalanches of unknown snow type, naturals only
27	AAI.unknown.EXPLO	The avalanche activity index, all snow avalanches of unknown snow type, explosive-controlled only.
28	AAI.unknown.UNKNOWN	The avalanche activity index, all snow avalanches of unknown snow type, unknown trigger type only.
29	mixed.SIZE1	Number of avalanches: mixed-snow, size 1 avalanche.
30	mixed.SIZE2	Number of avalanches: mixed-snow, size 2 avalanche.
31	mixed.SIZE3	Number of avalanches: mixed-snow, size 3 avalanche.
32	mixed.SIZE4	Number of avalanches: mixed-snow, size 4 avalanche.
33	mixed.HUMAN.SIZE1	Number of avalanches: mixed-snow, human-triggered, size 1 avalanche.
34	mixed.HUMAN.SIZE2	Number of avalanches: mixed-snow, human-triggered, size 2 avalanche.
35	mixed.HUMAN.SIZE3	Number of avalanches: mixed-snow, human-triggered, size 3 avalanche.
36	mixed.HUMAN.SIZE4	Number of avalanches: mixed-snow, human-triggered, size 4 avalanche.
37	mixed.NATURAL.SIZE1	Number of avalanches: mixed-snow, natural, size 1 avalanche.
38	mixed.NATURAL.SIZE2	Number of avalanches: mixed-snow, natural, size 2 avalanche.
39	mixed.NATURAL.SIZE3	Number of avalanches: mixed-snow, natural, size 3 avalanche.
40	mixed.NATURAL.SIZE4	Number of avalanches: mixed-snow, natural, size 4 avalanche.
41	mixed.EXPLO.SIZE1	Number of avalanches: mixed-snow, explosive-controlled, size 1 avalanche.

42	mixed.EXPLO.SIZE2	Number of avalanches: mixed-snow, explosive-controlled, size 2 avalanche.
43	mixed.EXPLO.SIZE3	Number of avalanches: mixed-snow, explosive-controlled, size 3 avalanche.
44	mixed.EXPLO.SIZE4	Number of avalanches: mixed-snow, explosive-controlled, size 4 avalanche.
45	mixed.UNKNOWN.SIZE1	Number of avalanches: mixed-snow, unknown trigger type, size 1 avalanche.
46	mixed.UNKNOWN.SIZE2	Number of avalanches: mixed-snow, unknown trigger type, size 2 avalanche.
47	mixed.UNKNOWN.SIZE3	Number of avalanches: mixed-snow, unknown trigger type, size 3 avalanche.
48	mixed.UNKNOWN.SIZE4	Number of avalanches: mixed-snow, unknown trigger type, size 4 avalanche.
49	wet.SIZE1	Number of avalanches: wet-snow, size 1 avalanche.
50	wet.SIZE2	Number of avalanches: wet-snow, size 2 avalanche.
51	wet.SIZE3	Number of avalanches: wet-snow, size 3 avalanche.
52	wet.SIZE4	Number of avalanches: wet-snow, size 4 avalanche.
53	wet.HUMAN.SIZE1	Number of avalanches: wet-snow, human-triggered, size 1 avalanche.
54	wet.HUMAN.SIZE2	Number of avalanches: wet-snow, human-triggered, size 2 avalanche.
55	wet.HUMAN.SIZE3	Number of avalanches: wet-snow, human-triggered, size 3 avalanche.
56	wet.HUMAN.SIZE4	Number of avalanches: wet-snow, human-triggered, size 4 avalanche.
57	wet.NATURAL.SIZE1	Number of avalanches: wet-snow, natural, size 1 avalanche.
58	wet.NATURAL.SIZE2	Number of avalanches: wet-snow, natural, size 2 avalanche.
59	wet.NATURAL.SIZE3	Number of avalanches: wet-snow, natural, size 3 avalanche.
60	wet.NATURAL.SIZE4	Number of avalanches: wet-snow, natural, size 4 avalanche.
61	wet.EXPLO.SIZE1	Number of avalanches: wet-snow, explosive-controlled, size 1 avalanche.
62	wet.EXPLO.SIZE2	Number of avalanches: wet-snow, explosive-controlled, size 2 avalanche.
63	wet.EXPLO.SIZE3	Number of avalanches: wet-snow, explosive-controlled, size 3 avalanche.
64	wet.EXPLO.SIZE4	Number of avalanches: wet-snow, explosive-controlled, size 4 avalanche.
65	wet.UNKNOWN.SIZE1	Number of avalanches: wet-snow, unknown trigger type, size 1 avalanche.

66	wet.UNKNOWN.SIZE2	Number of avalanches: wet-snow, unknown trigger type, size 2 avalanche.
67	wet.UNKNOWN.SIZE3	Number of avalanches: wet-snow, unknown trigger type, size 3 avalanche.
68	wet.UNKNOWN.SIZE4	Number of avalanches: wet-snow, unknown trigger type, size 4 avalanche.
69	dry.SIZE1	Number of avalanches: dry-snow, size 1 avalanche.
70	dry.SIZE2	Number of avalanches: dry-snow, size 2 avalanche.
71	dry.SIZE3	Number of avalanches: dry-snow, size 3 avalanche.
72	dry.SIZE4	Number of avalanches: dry-snow, size 4 avalanche.
73	dry.HUMAN.SIZE1	Number of avalanches: dry-snow, human-triggered, size 1 avalanche.
74	dry.HUMAN.SIZE2	Number of avalanches: dry-snow, human-triggered, size 2 avalanche.
75	dry.HUMAN.SIZE3	Number of avalanches: dry-snow, human-triggered, size 3 avalanche.
76	dry.HUMAN.SIZE4	Number of avalanches: dry-snow, human-triggered, size 4 avalanche.
77	dry.NATURAL.SIZE1	Number of avalanches: dry-snow, natural, size 1 avalanche.
78	dry.NATURAL.SIZE2	Number of avalanches: dry-snow, natural, size 2 avalanche.
79	dry.NATURAL.SIZE3	Number of avalanches: dry-snow, natural, size 3 avalanche.
80	dry.NATURAL.SIZE4	Number of avalanches: dry-snow, natural, size 4 avalanche.
81	dry.EXPLO.SIZE1	Number of avalanches: dry-snow, explosive-controlled, size 1 avalanche.
82	dry.EXPLO.SIZE2	Number of avalanches: dry-snow, explosive-controlled, size 2 avalanche.
83	dry.EXPLO.SIZE3	Number of avalanches: dry-snow, explosive-controlled, size 3 avalanche.
84	dry.EXPLO.SIZE4	Number of avalanches: dry-snow, explosive-controlled, size 4 avalanche.
85	dry.UNKNOWN.SIZE1	Number of avalanches: dry-snow, unknown trigger type, size 1 avalanche.
86	dry.UNKNOWN.SIZE2	Number of avalanches: dry-snow, unknown trigger type, size 2 avalanche.
87	dry.UNKNOWN.SIZE3	Number of avalanches: dry-snow, unknown trigger type, size 3 avalanche.
88	dry.UNKNOWN.SIZE4	Number of avalanches: dry-snow, unknown trigger type, size 4 avalanche.
89	unknown.SIZE1	Number of avalanches: Snow type unknown, size 1 avalanche.

90	unknown.SIZE2	Number of avalanches: Snow type unknown, size 2 avalanche.
91	unknown.SIZE3	Number of avalanches: Snow type unknown, size 3 avalanche.
92	unknown.SIZE4	Number of avalanches: Snow type unknown, size 4 avalanche.
93	unknown.HUMAN.SIZE1	Number of avalanches: Snow type unknown, human-triggered, size 1 avalanche.
94	unknown.HUMAN.SIZE2	Number of avalanches: Snow type unknown, human-triggered, size 2 avalanche.
95	unknown.HUMAN.SIZE3	Number of avalanches: Snow type unknown, human-triggered, size 3 avalanche.
96	unknown.HUMAN.SIZE4	Number of avalanches: Snow type unknown, human-triggered, size 4 avalanche.
97	unknown.NATURAL.SIZE1	Number of avalanches: Snow type unknown, natural, size 1 avalanche.
98	unknown.NATURAL.SIZE2	Number of avalanches: Snow type unknown, natural, size 2 avalanche.
99	unknown.NATURAL.SIZE3	Number of avalanches: Snow type unknown, natural, size 3 avalanche.
100	unknown.NATURAL.SIZE4	Number of avalanches: Snow type unknown, natural, size 4 avalanche.
101	unknown.EXPLO.SIZE1	Number of avalanches: Snow type unknown, explosive-controlled, size 1 avalanche.
102	unknown.EXPLO.SIZE2	Number of avalanches: Snow type unknown, explosive-controlled, size 2 avalanche.
103	unknown.EXPLO.SIZE3	Number of avalanches: Snow type unknown, explosive-controlled, size 3 avalanche.
104	unknown.EXPLO.SIZE4	Number of avalanches: Snow type unknown, explosive-controlled, size 4 avalanche.
105	unknown.UNKNOWN.SIZE1	Number of avalanches: Snow type unknown, unknown trigger type, size 1 avalanche.
106	unknown.UNKNOWN.SIZE2	Number of avalanches: Snow type unknown, unknown trigger type, size 2 avalanche.
107	unknown.UNKNOWN.SIZE3	Number of avalanches: Snow type unknown, unknown trigger type, size 3 avalanche.
108	unknown.UNKNOWN.SIZE4	Number of avalanches: Snow type unknown, unknown trigger type, size 4 avalanche.
109	SIZE_234	Number of avalanches: all avalanches of size 2, 3 or 4.
110	NATURAL.SIZE_234	Number of avalanches: all natural avalanches of size 2, 3 or 4.
111	HUMAN.SIZE_234	Number of avalanches: all human-triggered avalanches of size 2, 3 or 4.

112	UNKNOWN.SIZE_234	Number of avalanches: all unknown trigger type avalanches of size 2, 3 or 4.
113	NATURAL.UNKNOWN.SIZE_1234	Number of avalanches: all natural and unknown trigger type avalanches, all sizes
114	NATURAL.SIZE_1234	Number of avalanches: all natural avalanches, all sizes
115	dry.NATURAL.SIZE_1234	Number of avalanches: all dry-snow, natural avalanches, all sizes
116	wet.NATURAL.SIZE_1234	Number of avalanches: all wet-snow, natural avalanches, all sizes
117	SIZE1	Number of avalanches: all avalanches of size 1
118	SIZE2	Number of avalanches: all avalanches of size 2
119	SIZE3	Number of avalanches: all avalanches of size 3
120	SIZE4	Number of avalanches: all avalanches of size 4
121	SIZE_1234	Number of avalanches: all avalanches, all sizes
122	max.SIZE	Largest avalanche size per day

Davos, 2 February 2020/Sz