

Gefahrenstufen 1 gering 2 mässig 3 erheblich 4 gross 5 sehr gross

Prognose der Lawinengefahr

Erheblich, Stufe 3

Triebsschnee

Gefahrenstellen

Die frischen Triebsschneeanisammlungen können schon von einzelnen Wintersportlern ausgelöst werden. Schneesport abseits gesicherter Pisten erfordert viel Erfahrung in der Beurteilung der Lawinengefahr.

Altschnee

Lawinen können vereinzelt mit meist grosser Belastung im schwachen Altschnee ausgelöst werden. Vorsicht an steilen, eher schneearmen Schattenhängen oberhalb von rund 2500 m. Diese Gefahrenstellen sind selten aber schwer zu erkennen. Wummgeräusche und Risse beim Betreten der Schneedecke können auf die Gefahr hinweisen.

Carrier 10:32 AM

zurück Lawinengefahr

Lawinengefahr

Livevermittlung für Xenaclay, 31. Februar 2013

Details

1 gering 2 mässig 3 erheblich 4 gross 5 sehr gross

Lawinen Schnee Wasser Mehr



Evaluating the fully automatic multi-language translation of the Swiss avalanche bulletin

Kurt Winkler¹, Tobias Kuhn², Martin Volk³

¹WSL Institute for Snow and Avalanche Research SLF, Switzerland

²Department of Humanities, Social and Political Sciences, ETH Zurich, Switzerland

³Universität Zürich, Institut für Computerlinguistik, Switzerland



Avalanches in Switzerland

25 victims / year

avalanche bulletin

- since 1945
- re-launch 2012
- www.slf.ch, app "White Risk", print...

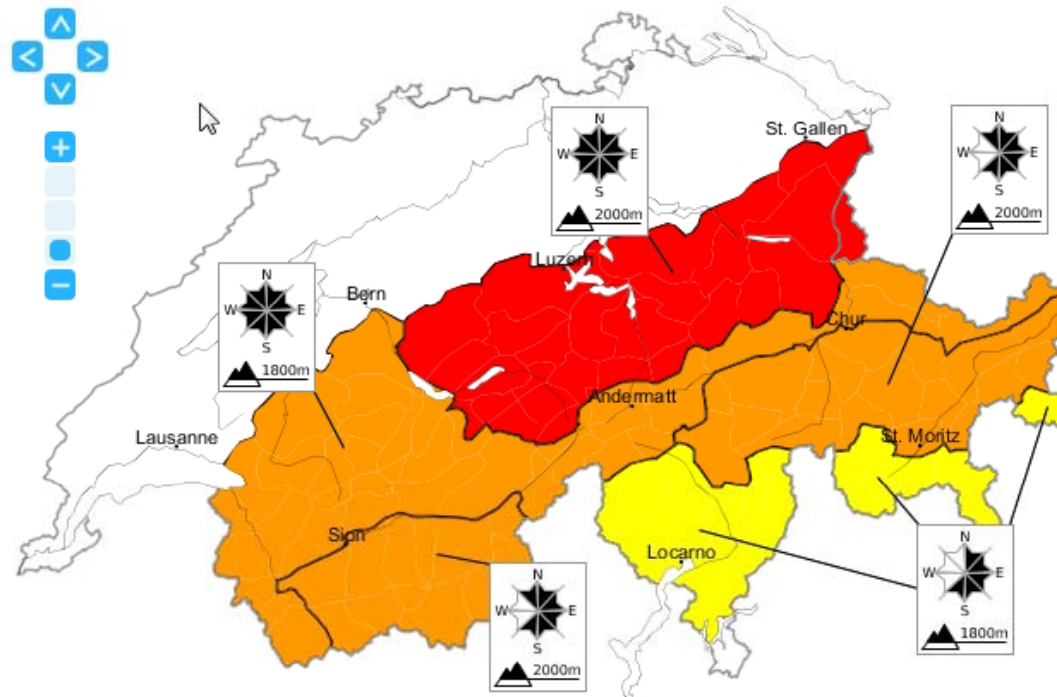


Lawinenbulletin für Sonntag, 1. April 2012

Im Norden gebietsweise grosse Lawinengefahr.

Aktualisiert am 31.3., 17:00 Nächster Update: 1.4., 08:00 [Gültigkeit](#)

[Lawinengefahr](#) | [Schneedecke und Wetter](#)



Gefahrenstufen ■ 1 gering ■ 2 mässig ■ 3 erheblich ■ 4 gross ■ 5 sehr gross [i](#)

Lawinenbulletin zum Drucken

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Schneekarten

- [Neuschnee 1 Tag / 3 Tage](#)
- [Schneehöhe / 2000m / %](#)
- [Schneedeckenstabilität](#)

Wochenbericht

aktualisiert am 02.08.2012, 17:00



[Bericht / Fotoalbum](#)

Messwerte

[Schnee / Wind und Temperatur](#)

Meldung an Lawinenwarner

[Beobachtungen, Lawine ausgelöst?](#)

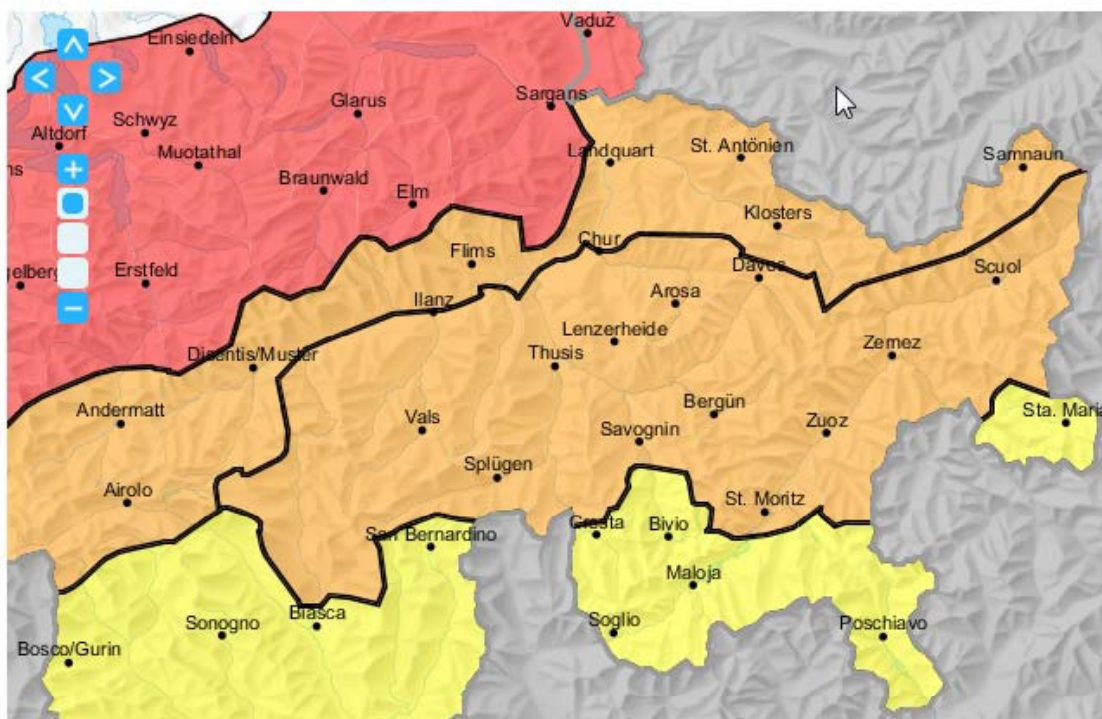
[Erklärungen](#)

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Lawinengefahr | **Schneedecke und Wetter**



Gefahrenstufen 1 gering 2 mässig 3 erheblich 4 gross 5 sehr gross [i](#)

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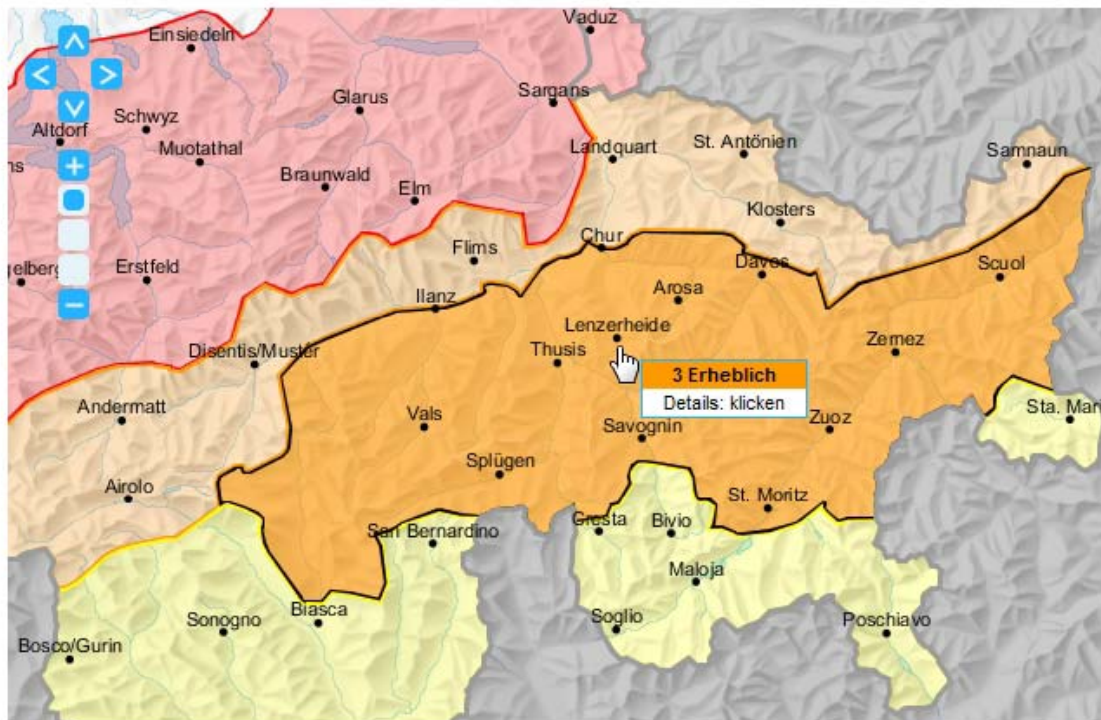
Erklärungen

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Lawinengefahr | Schneedecke und Wetter



Gefahrenstufen ■ 1 gering ■ 2 mässig ■ 3 erheblich ■ 4 gross ■ 5 sehr gross

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[Beobachtungen, Lawine ausgelöst?](#)

danger description

DE FR IT EN RSS MEDIEN KONTAKT

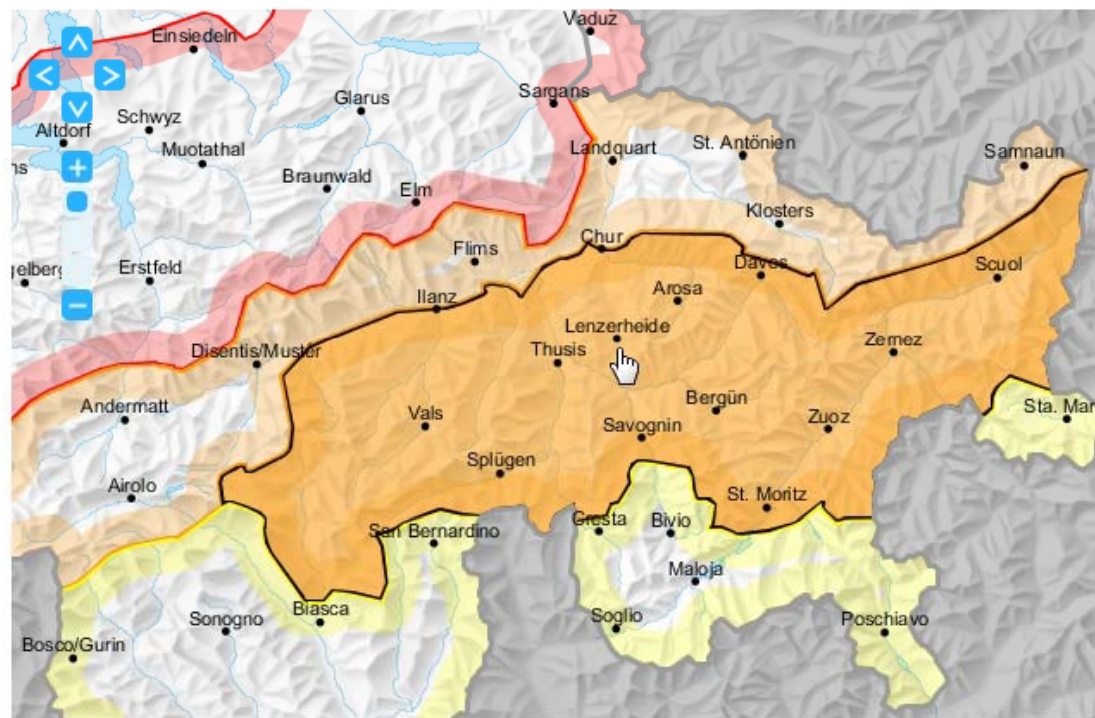
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Lawinenbulletin für Sonntag, 1. April 2012

Im Norden gebietsweise grosse Lawinengefahr.

Aktualisiert am 31.3., 17:00 Nächster Update: 1.4., 08:00 [Gültigkeit](#)

Lawinengefahr Schneedecke und Wetter



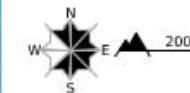
Gefahrenstufen 1 gering 2 mässig 3 erheblich 4 gross 5 sehr gross

Prognose der Lawinengefahr

Erheblich, Stufe 3

Tribschnee

Gefahrenstellen



Vor allem an den Expositionen Nordwest über Nord bis Südwest oberhalb von rund 2000m.

Gefahrenbeschreibung

Die frischen Tribschneeansammlungen können teilweise schon von einzelnen Wintersportlern ausgelöst werden. Sie sollten gemieden werden. Schneesport abseits gesicherter Pisten erfordert Erfahrung in der Beurteilung der Lawinengefahr.

Altschnee

Lawinen können vereinzelt mit meist grosser Belastung im schwachen Altschnee ausgelöst werden. Vorsicht an steilen, eher schneearmen Schattenhängen oberhalb von rund 2500 m. Diese Gefahrenstellen sind selten aber schwer zu erkennen. Wummgeräusche und Risse beim Betreten der Schneedecke können auf die Gefahr hinweisen.

[Beobachtungen, Lawine beobachtet](#)

[Erklärungen](#)

Lawinenbulletin für Sonntag, 1. April 2012

Im Norden gebietsweise grosse Lawinengefahr.

Aktualisiert am 31.03.2012, 17:00. Nächster Update: [Gültigkeit](#)

Lawinengefahr | **Schneedecke und Wetter**

Schneedecke

Frische, grosse Triebsschneeansammlungen überlagern teils lockere Neuschneeschnichten und sind störanfällig. In den inneralpinen Gebieten des Wallis und Graubündens sind oberhalb von etwa 2500 m die untersten Schichten der Schneedecke teils kantig aufgebaut und schwach verfestigt.

Wetter Rückblick auf Sonntag, 1. April 2012

Es war stark bewölkt und es schneite bis in tiefe Lagen. Nur ganz im Süden gab es Aufhellungen.

Neuschnee

In den letzten zwei Tagen fielen folgende Schneemengen:

- zentraler und östlicher Alpennordhang: verbreitet 30 bis 50 cm, in den Glarner Alpen bis 80 cm
- westlicher Alpennordhang, nördliches Wallis, Nord- und Mittelbünden: 15 bis 30 cm
- weiter südlich deutlich weniger

Temperatur

Am Mittag auf 2000 m etwa minus 6 Grad.

Wind

Mässig bis stark aus Nordwest.

Wetter Prognose für Sonntag, 1. April 2012

Es ist stark bewölkt und es schneit. Nur im Süden ist es teils sonnig.

snow cover and weather

- evening (5 pm)
- normally written and manually translated

Lawinenbulletin zum Drucken

[Alle Printprodukte](#)



Schneekarten

- [Neuschnee 1 Tag / 3 Tage](#)
- [Schneehöhe / 2000m / %](#)
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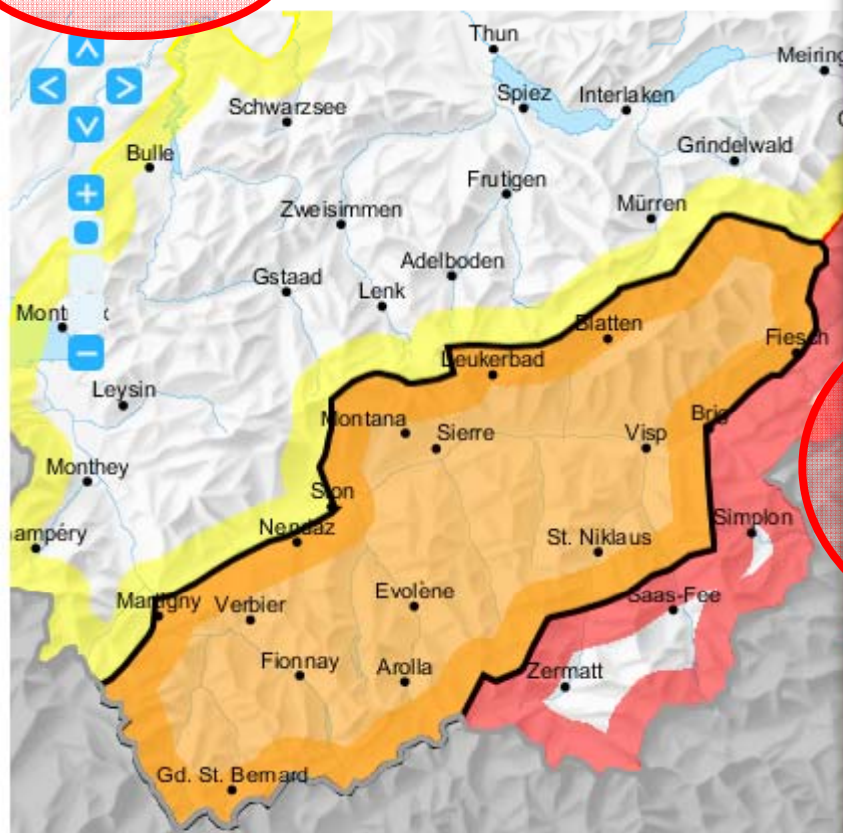
Danger description

- evening and morning (5 pm, 8 am)
- automated translation (catalogue of phrases)

In the south a high avalanche danger will be encountered over a wide area

Edition: 26.12., 08:00 Next update: 26.12., 17:00 [Validity](#)

Avalanche danger Snowpack and weather



Danger levels ■ 1 low ■ 2 moderate ■ 3 considerable ■ 4 high

Avalanche danger forecast

Level 3, considerable

Fresh snow and snow drifts

Avalanche prone locations



In all aspects above approximately 2000m.

Danger description

The avalanche danger will increase during the day. The fresh snow and snow drift accumulations will be deposited on a weakly bonded old snowpack in particular on shady slopes and generally at elevated altitudes. Avalanches can be released, even by a single winter sport participant or triggered naturally. Snow sport activities outside marked and open pistes call for experience in the assessment of avalanche danger and caution.

Full-depth avalanches

On steep grassy slopes small and, in isolated cases, medium-sized full-depth avalanches are possible below approximately 2000 m. Areas with glide cracks are to be avoided as far as possible.

[Information on snowpack and weather](#)

Automated translation – why ?

New bulletin: all products in 4 languages

- no additional money for translations

Morning edition: field observations came in until issue time (8 am).

- no time for manual translations
- no time for proof-reading or corrections (in target languages)



Automated translation

Machine translation

- quality insufficient for life-critical warnings

Automated translation

~~Machine translation~~

- ~~• quality insufficient for life-critical warnings~~

Memory system (translations of 15 years)

- Already used to reduce the translation time.
- Not comprehensive enough to extract a catalogue of phrases, or for statistical machine translation¹

¹ Lepsus T., Langlais P. and Lapalme G., 2004. A corpus-based Approach to Weather Report Translation. Technical Report, University of Montréal, Canada.

Automated translation

~~Machine translation~~

- ~~• quality insufficient for life-critical warnings~~

~~Memory system (translations of 15 years)~~

- ~~• Already used to reduce the translation time.~~
- ~~• Not comprehensive enough to extract a catalogue of phrases, or for statistical machine translation¹~~

Catalogue of phrases

- Meteo Centrale: used for severe weather warnings



¹ Lepsus T., Langlais P. and Lapalme G., 2004. A corpus-based Approach to Weather Report Translation. Technical Report, University of Montréal, Canada.

Catalogue-based translation system

Segment 1	Segment 2	Segment 3	Segment 4
Adjacent to the ridge line		snow drift accumulations	will form.
As a consequence of the strong wind	small		have formed.
During the night	hard		
	further		
	easily released		
	clearly visible		

- sentences = succession of segments
- segments = lists of predefined options
- translation must take place on the segment level
- not all possible sentences are meaningful, but
- all those that make sense must have correct translations

Catalogue-based translation system

Segment 1		Segment 2	Segment 3	Segment 4
Adjacent to the ridge line			snow drift accumulations	will form.
As a consequence of the strong wind		small		have formed.
During the night		hard		
sub-segment 1.4-1	sub-segment 1.4-2	further		
In particular	at high altitude	easily released		
Even	in high Alpine regions	clearly visible		
	above the tree line			

- sentences = succession of segments
- segments = lists of predefined options
- translation must take place on the segment level
- not all possible sentences are meaningful, but
- all those that make sense must have correct translations
- options can consist of series of sub-segments

Rules for the sentences in German

No specific simplified grammar.

Rules for the sentences in German

No specific simplified grammar.

Adjectives refer to subjects with the same gender and number in all the options (in each individual language).

→ The translation of the subjects must already be known.

Rules for the sentences in German

No specific simplified grammar.

Adjectives refer to subjects with the same gender and number in all the options (in each individual language).

Articles and prepositions are usually included in the same option as the noun.

Segment 1

in the other regions

on the northern Alpine ridge

in Val Calanca

Rules for the sentences in German

Demonstrative pronouns substitute one specific noun. It is indicated in the editor.

Segment 1

Avalanches

Wet avalanches

Snow drifts

They (= "avalanches")

→ IT: "*queste ultime*" (feminine)

They (= "snow drifts")

→ IT: "*questi ultimi*" (masculine)

Catalogue

110 sentences

1 to 10 segments

1 to 250 predefined options

options can contain sub-(sub-)segments

>> 1000000000000 different sentences possible



Translation of the catalogue

Manual translation allow

- replacing adjectives with participles or adverbs
- active ↔ passive formulation
- synonyms



Translation of the catalogue

The segment order could vary between the languages.

Segment 1	Segment 2	Segment 3	Segment 4	Segment 5
Mit dem Schneefall	steigt die Gefahr			an.
An Sonnenhängen		ab dem Morgen	allmählich	
Im Hochgebirge		am Mittag	rasch	
In diesen Gebieten		im Tagesverlauf	vorübergehend	

Segment 3	Segment 1	Segment 2	Segment 4
	as a consequence of the snowfall	there will be	an increase in the danger.
From the early morning	on sunny slopes		a gradual increase in the danger.
In the middle of the day	in high Alpine regions		a rapid increase in the danger.
As the day progresses	in this regions		an increase in the danger for a short time.

(segments with 1 option must not be used in every language)

(parts of the text can be relocated to other segments)

Translation of the catalogue

The segment order could vary between the languages.

Each segment could be split in two.

- target languages only
- this limits our system to German → other languages

Segment 1	Segment 2	Segment 3	Segment 4	Segment 5
die Lawinen	können			gross werden.
nasse Lawinen		auch	oft	weit vorstossen.
diese		{on_steep} Sonnenhängen	weiterhin	bis in die aperen Täler vorstossen.
		in diesen Gebieten		bis in tiefe Lagen vorstossen.

Segment 3a	Segment 1	Segment 2	Segment 3b	Segment 4	Segment 5
	the avalanches	can			reach large size.
	wet avalanches		also	in many cases	reach a long way.
{on_steep} sunny slopes	they			as before	reach the bare valleys.
in these regions					reach low altitudes.

Translation of the catalogue

The segment order could vary between the languages.

Each segment could be split in two.

- target languages only
- this limits our system to German → other languages

No logical functions or distinction of cases.

Translation of the catalogue

The segment order could vary between the languages.

Each segment could be split in two.

- target languages only
- this limits our system to German → other languages

No logical functions or distinction of cases

Chef of the translation agency:

~~"Stilt houses-technique"~~

"Neanderthal man-technique"



Operational service

Editor with search engine

tagesverl erheblich erreicht

Änderung03 Die Lawinenspitze, Gefahrenstufe wird {wo_Gefahrenspitze1} {Zeit} erreicht {wo_Gefahrenspitze2} (-).
Die bitte auswählen wird bitte auswählen bitte auswählen bitte auswählen bitte auswählen

Änderung05 Dort wo, Wenn mehr Schnee, Wind wird die Gefahrenstufe (früher) erreicht.
bitte auswählen mehr als {20} cm Schnee fallen {wird_die} {Gefahrenstufe_n} erreicht.
In den Gebieten wo mehr Schnee fällt wird die
Dort wo mehr als {Zahl} cm Schnee fallen wird rasch die
Dort wo lokal viel Schnee fällt wird in der Nacht die
Besonders dort wo Regen fällt wird im Tagesverlauf die
Überall dort wo viel Regen fällt wird am Morgen die
Wenn die Schneefallgrenze höher liegt wird am Vormittag die
die Schneefallgrenze über {Höhe_m} steigt wird am Mittag die
der Wind stark bläst wird am Nachmittag die
der Wind stärker bläst wird am Abend die
der Wind stürmisch bläst {wird_die} {Gefahrenstufe_n} erreicht.
die Nacht bedeckt ist wird die {Gefahrenstufe_n} bereits früher erreicht.
die Nacht bedeckt war {kann_die} {Gefahrenstufe_n} erreicht werden.
die nächtliche Abstrahlung reduziert ist kann die {Gefahrenstufe_n} bereits früher erreicht werden.
die nächtliche Abstrahlung reduziert war ist die Lawinengefahr höher.
die Sonne hervorkommt steigt die Gefahr schon früher an.
steigt die Gefahr schneller an.
besteht die Gefahr schon am Morgen.

Operational service

Editor with search engine

Danger descriptions were proof-read and discussed by at least two avalanche forecasters (in German).

Operational service

Editor with search engine

Danger descriptions were proof-read and discussed by at least two avalanche forecasters (in German).

German text is correct:

→ 150-200 products (in all languages)
generated and published without any proofreading

Content

Source language

Forecasters:

"Differences between what you wanted to write and what you could write with the catalogue..."

→ *"greater limitations"* never occurred (> 2000 descriptions)

Target languages

The translations are more exact as before.

(The manual translations lacked the time to correct smaller inconsistencies).

Language quality

Controlled Natural Language (CNL)

PENS categorization scheme¹

P=2: relatively low precision
E=2: relatively low expressiveness
N=5: maximally natural
S=4: comparatively simple

} in a formal semantics
point of view

¹ Kuhn T., 2014. A Survey and Classification of Controlled Natural Languages. Computational Linguistics, 40(1).

Language quality: survey 1

www.slf.ch, February 2014

2475 participants

How do you rate the quality of articulation:

- 'snowcover and weather' section?***
- danger descriptions?***

- (5) very good
 - (4) rather good
 - (3) neither good nor bad
 - (2) rather bad
 - (1) very bad
- ← mean: 4.4

Language quality: survey 1

	all	German	English	French	Italian
danger descriptions	4.44	4.47	4.28	4.36	4.45
snowcover and weather	4.38	4.40	4.18	4.31	4.41

Significances

- Danger descriptions better than "snowcover and weather" (all, German).
- German better than French (danger descriptions, snowcover and weather)

Language quality: survey 2

204 participants

(German 76, French 55, Italian 55, English 18)

Blind test between real danger descriptions

- 60 "old" (2008-12)
- 60 "new" (2013)

Each participant

- 10 "old" + 10 "new"

Survey 2: example (EN)

Snowdrift accumulations occur most frequently in areas adjacent to ridge lines and pass areas, as well as in gullies and bowls. They are small sized, for the most part, but can be easily triggered in some places. They should be assessed with great care. A prudent route selection is important.

Fresh and somewhat older snow drift accumulations are to be found in particular adjacent to the ridge line and in gullies and bowls. Avalanches can in isolated cases be released by a single winter sport participant, but they will be small in most cases. In high Alpine regions avalanche prone locations are more prevalent and the danger is greater. Careful route selection is recommended.

Survey 2: example (EN)

Snowdrift accumulations occur most frequently in areas

adjacent

Origin

in gullies

and bow

o normally written, manually translated

, but can be

easily to

o catalogue of phrases

assessed with

great care. A prudent route selection is important.

Fresh and somewhat older snow drift accumulations are to be

found in

Origin

in gullies

and bow

o normally written, manually translated

caused by a

single v

o catalogue of phrases

fall in most

cases. In high alpine regions avalanche prone locations are

more prevalent and the danger is greater. Careful route

selection is recommended.

Survey 2: example (EN)

Snowdrift accumulations occur most frequently in areas adjacent to gullies and boulders, but can be easily traversed with great care. A prudent route selection is important.

Origin 28.2.2011

X normally written, manually translated

o catalogue of phrases

Fresh and somewhat older snow drift accumulations are to be found in gullies and boulders, eased by a single view, all in most cases. In high alpine regions avalanche prone locations are more prevalent and the danger is greater. Careful route selection is recommended.

Origin 14.2.2013

o normally written, manually translated

X catalogue of phrases

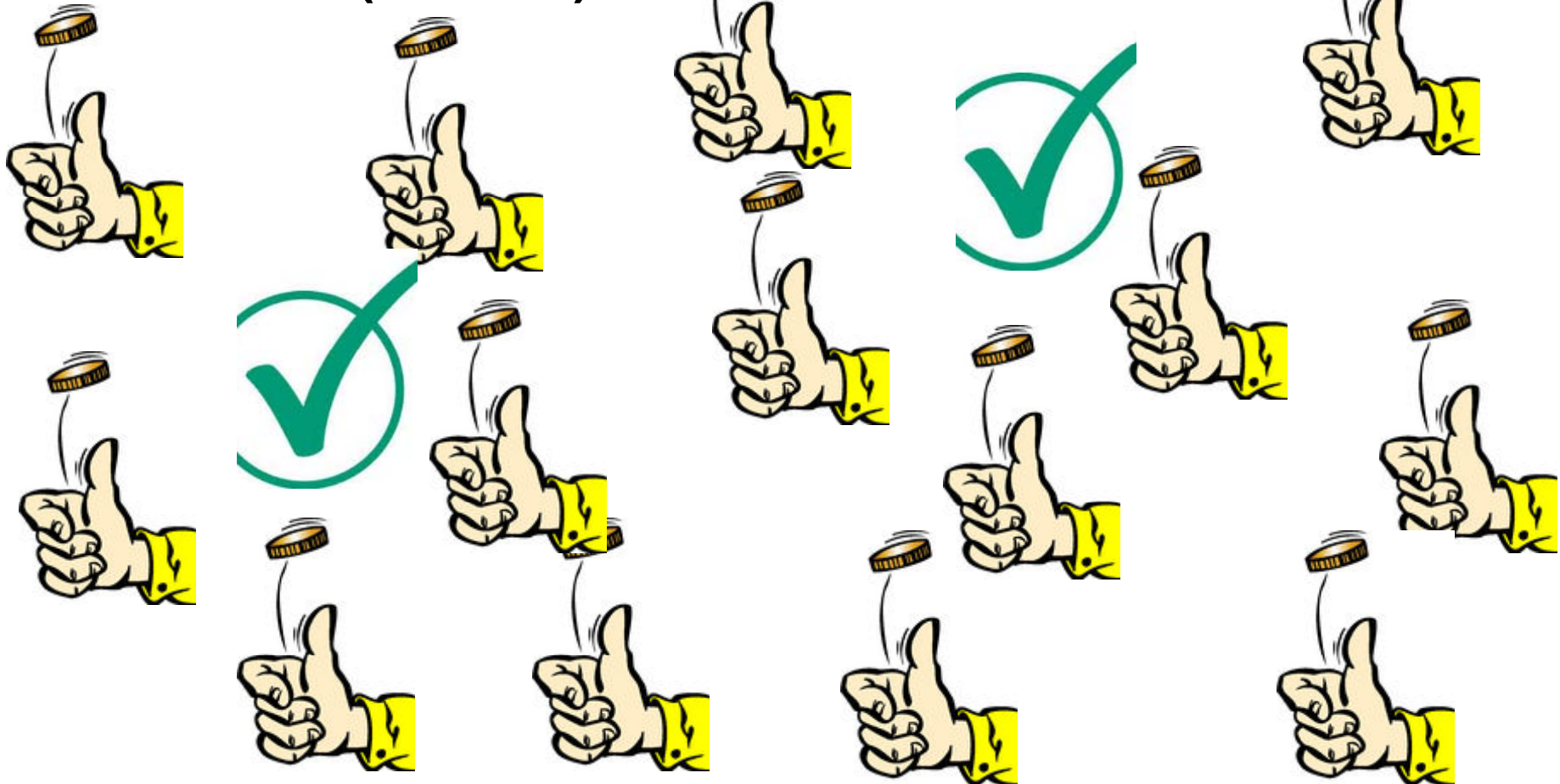
Correct origin

GE: 59 %

FR: 55 %

IT, EN: 52 % (random)

mean: 55 % (11 of 20)



Questions (language quality)

Is the text correct?

(5) *Absolutely correct*

(4) *1 minor error*

(3) *several minor errors or 1 major error*

(2) *several major errors*

(1) *Completely wrong*

() *I cannot judge*

← mean 4.39

("minor error" = typing mistake, incorrect punctuation or use of upper/lower case letters...)

Questions (language quality)

Is the text correct?

Is the language easy to understand?

(5) *Very easy to understand*

(4) *Easy to understand* ← mean 4.14

(3) *Understandable*

(2) *Difficult to understand*

(1) *Incomprehensible*

(Assuming that the reader is familiar with the key technical terms)

Questions (language quality)

Is the text correct?

Is the language easy to understand?

Is the text well formulated and pleasant to read?

(5) *Very well crafted*

(4) *Easy to read*

← mean 3.87

(3) *Clear*

(2) *Difficult to read*

(1) *Barely or not at all readable*

Questions (language quality)

Is the text correct?

Is the language easy to understand?

Is the text well formulated and pleasant to read?

Is the situation described clearly?

(5) *Clearly and precisely*

(4) *Reasonably clearly* ← mean 4.16

(3) *Understandably*

(2) *Unclearly, without meaning*

(1) *Incomprehensibly, with contradictions*

Rating

	correct	compre- hensible	read- able	clear	all
German n=1520	4.75	4.30	3.93	4.29	4.32
English n=360	3.89	3.74	3.51	3.73	3.72
French n=1100	4.57	4.30	4.07	4.34	4.32
Italian n=1100	4.35	4.21	3.99	4.28	4.21
all n=4x360	4.39	4.14	3.87	4.16	4.14

new bulletin

Rating

	correct	compre- hensible	read- able	clear	all
German n=1520	4.75	4.30	3.93	4.29	4.32
English n=360	3.89	3.74	3.51	3.73	3.72
French n=1100	4.57	4.30	4.07	4.34	4.32
Italian n=1100	4.35	4.21	3.99	4.28	4.21
all n=4x360	4.39	4.14	3.87	4.16	4.14

new bulletin

Rating

	correct	compre- hensible	read- able	clear	all
German n=1520	4.75	4.30	3.93	4.29	4.32
English n=360	3.89	3.74	3.51	3.73	3.72
French n=1100	4.57	4.30	4.07	4.34	4.32
Italian n=1100	4.35	4.21	3.99	4.28	4.21
all n=4x360	4.39	4.14	3.87	4.16	4.14

new bulletin

Rating

	correct	compre- hensible	read- able	clear	all
German n=1520	4.75 (+0.03)	4.30 (+0.13)	3.93 (+0.05)	4.29 (+0.16)	4.32 (+0.09)
English n=360	3.89 (-0.01)	3.74 (+0.01)	3.51 (+0.03)	3.73 (-0.05)	3.72 (0.00)
French n=1100	4.57 (-0.12)	4.30 (-0.04)	4.07 (-0.11)	4.34 (+0.01)	4.32 (-0.07)
Italian n=1100	4.35 (-0.16)	4.21 (-0.09)	3.99 (-0.08)	4.28 (-0.12)	4.21 (-0.11)
all n=4x360	4.39 (-0.06)	4.14 (+0.04)	3.87 (-0.03)	4.16 (0.00)	4.14 (-0.02)

new bulletin
(new – old)

Conclusions

A catalogue based translation system

- Was done in an empirical way by an avalanche expert.
- Gives high-quality translations without any proofread.
- Problem: find the matching sentences fast enough
 - limited number of (universal) phrases
 - domain with small sublanguage only
- Frequent operational use is necessary
 - experience
 - good cost-benefit ratio

Conclusions

The catalogue-based system is well-suited to generate the Swiss avalanche bulletin.

- It is possible to describe the different avalanche situations.
- No change in working time.
- Recognizing the origin of the text is difficult (55%).
- The language quality did not change substantially with the introduction of the catalogue of phrases (1st survey ↗ , 2nd survey ↘)

Conclusions

Why did the system work?

- Because all the users are willing to use it.
- Maybe because we kept it simple.

Questions ?



Thanks to the translation agency: www.ttn.ch