CASE STUDY: ”SCHOBER AVALANCHE ON FEBRUARY 28th, 2009, STYRIA, AUSTRIA”

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ABSTRACT: On February 28th, 2009 at 07.00 a.m. the Schober avalanche cracked in an altitude of 1820 m above sea level as a slab avalanche with a fracture depth between 2 and 4 m and devastated an area of 10 ha. The peculiarity of this avalanche was the fact, that the avalanche started dry and became wet in the slab. A distance of more than 300 m in the ”safety zone” was covered although the steepness with less than 8 degrees was very slight. A part of the railway sidings was submerged with snow up to 8 m. The case study engages with the question which circumstances caused such big avalanches in February 2009. The Schober avalanche was not the only avalanche in Styria that broke as a dry slab and turned into a wet avalanche. More examples will be pointed out in this case study. Another aspect we discuss in this study are the warnings of the Styrian Avalanche Service and how they handled the situation on February 28th, 2009.

KEYWORDS: wet snow avalanche, slab avalanche, snow drift, Styrian Avalanche Service

1. THE METEOROLOGICAL SITUATION IN THE TIME BETWEEN JANUARY AND FEBRUARY 2009

In the last week of January 2009 more than 50 cm of fresh snow were observed in Styria (Austria). The snowfall occurred at northerly wind conditions. The snow was deposited on a hard and icy old snow cover. The cohesion between the old snow and the fresh snow was weak and this leaded to avalanche danger level 3. The very low air temperature delayed the setting of the snow cover. Due to warm wind conditions from south directions (called Foehn) at the beginning of February 2009 a lot of wet snow avalanches were observed. The air temperature in 2000 m above sea level (asl) exceeded 0°C which is demonstrated in Figure 4. These conditions effectuated an unfavorable snow situation which leaded to danger level 4 before the following weather improvement caused avalanche danger level 3. In the high regions of the Styrian Alps, snow drift accumulation and hard snow layers were detected.

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On February 8th wind direction changed to northwest which furthermore led to snow drift accumulations. On the Mount ”Grosser Schober” the air temperature decreased around 10 Kelvin. This situation had a negative effect relative to the avalanche danger. As demonstrated in Figure 4, the INCA*-analysis (INCA: Integrated Nowcasting through Comprehensive Analysis) shows a high temperature decrease. This type of analysis was used because no meteorological station is installed near Mount Schober. During this time the wind speed peaks were rather high (Figure 3) but not as heavy as on Mount Veitsch where peaks with 140 km/h were measured.

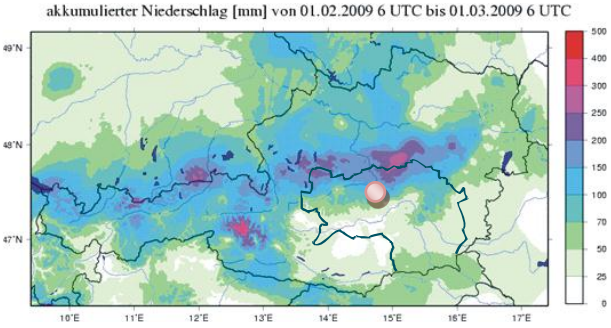

Figure 1: INCA-analysis of precipitation in February 2009

*INCA is a combination of different sources like model-, station-observations-, satellite- and radar data. The model output has grid point distances of 1 km and time steps between 15 to 60 minutes. We use INCA to obtain meteorological information from areas where no meteorological stations are available.

The INCA-analysis from Mount Schober does not show the appropriate wind speed. The analysis of the wind direction shows that the wind direction from Mount Schober was identical with measurements from the surrounding meteorological stations. More than 150 cm of fresh snow fell in the time between February 15th to February 25th.

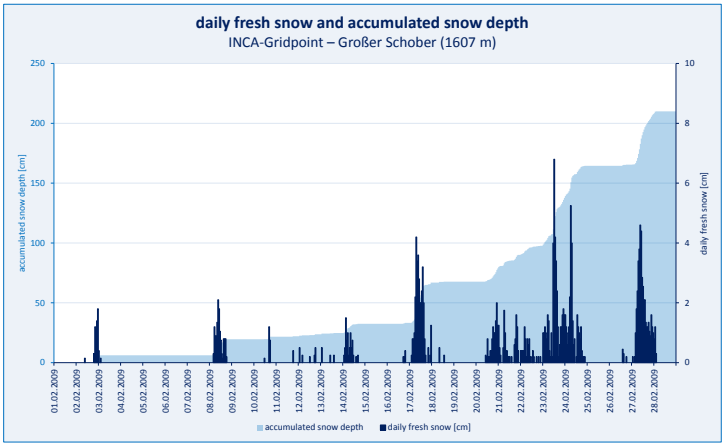

Figure 2: Daily fresh snow and accumulation snow depth INCA analysis on Mount Großer Schober

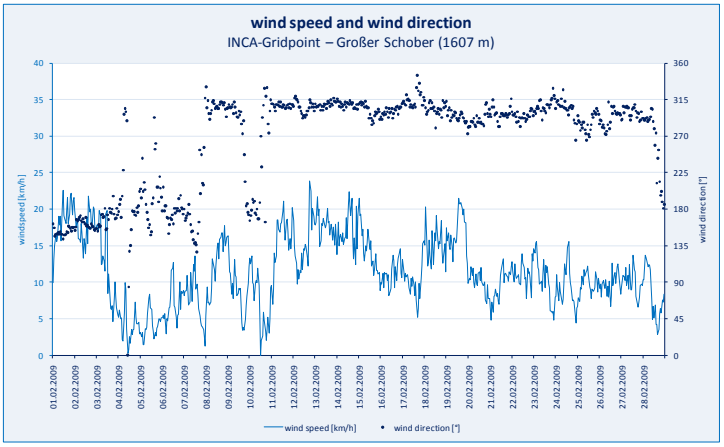

Figure 3: INCA wind speed and wind direction analysis on Mount Großer Schober

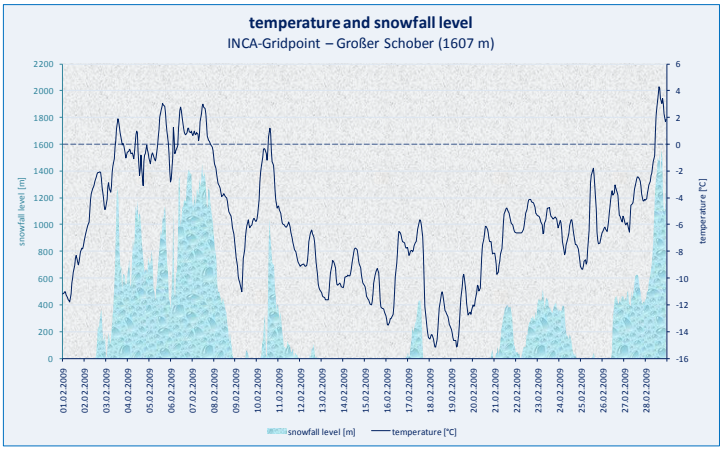

Figure 4: INCA temperature and snowfall level analysis on Mount Großer Schober

On February 25th there was an intermediate high with short-term good weather. The air temperature in 2000 m asl rose from –15°C (18.02.2010) to –2°C (25.02.2010).

On February 26th a new snowfall period started which lasted until 28th of February, while the temperature in 2000 m asl increased very fast. This fact was the final activator for the big avalanche “Mount Schober”.

2. THE SNOW SITUATION IN THE TIME BETWEEN JANUARY AND FEBRUARY 2009

The cold weather conditions we mentioned in chapter one activated the faceting in spite of the high snow cover. This faceting produced degradation from the base of the snowpack.

The great amount of drifting snow in the north expositions in February 2009 has two reasons: The first is the snowfall in February 2009, the second is outstanding phases of characteristically south foehn (05.01. – 14.01.2009, 18.01. – 27.01.2009 and 01.02. – 07.02.2009) in January and February. This special weather situation preceded huge snow drift accumulation in the north expositions. Such heavy snow drift accumulation has never been registered in the history of the Avalanche Service Styria before.

Figure 5: Starting zone from the Bruderkogel avalanche (Niedere Tauern), fracture depth 3,2 m. Photo: Alpine Police

In spite of the fact that the Avalanche Service noted many avalanches triggered by ski mountaineers no serious injuries happened. A representative example for the massive snow drift accumulation was the measured fracture depth of 3,2 m (Figure 5) at the Bruderkogel (Styria).

The Avalanche Service Styria knows this kind of avalanche situation very well. On February 28th there was a temperature forecast that expected warm conditions in 2000 m asl. So the Avalanche Service Styria issued a warning of spontaneous avalanches in the avalanche report in the morning of February 28th. As expected, many huge spontaneous avalanches (e.g. Kleinsölk, Eisenerz, Wildalpen) were registered during this day. One of them was the Schober avalanche.

3. DETAILS OF THE AVALANCHE “GROSSER SCHOBER”

February 28th was the day with the highest avalanche activity during the whole season 2008/09 in Styria. The Schober avalanche broke off in the morning of this day too. The starting zone of this avalanche was situated in 1820 m asl on an east slope near the summit of Mount Grosser Schober (1895 m). The slope angle was very steep (between 35° and 40°) and the fracture depth in the starting zone was up to 4 meters (Figure 6).

The area covered by the avalanche was 9,8 ha. As already mentioned the trigger of this avalanche was a combination of heavy snowfalls in January and February, snow drift (south stream) followed by a quick temperature increase. The avalanche started as a slab avalanche and converted to a wet snow avalanche at the end. In 900 m asl five braking hills were flushed down by the snow masses. The consequence was that the avalanche split into three arms. In the accumulation zone these arms deposited the railroad track on a distance of 500 m. The measurement of the snow mass volume resulted 92 000 m³. This avalanche caused damages on the railway track and on the high volt power line. Furthermore two houses had to be evacuated. As a result of this disaster two

new avalanche commissions were constituted in the area of Mount Schober.

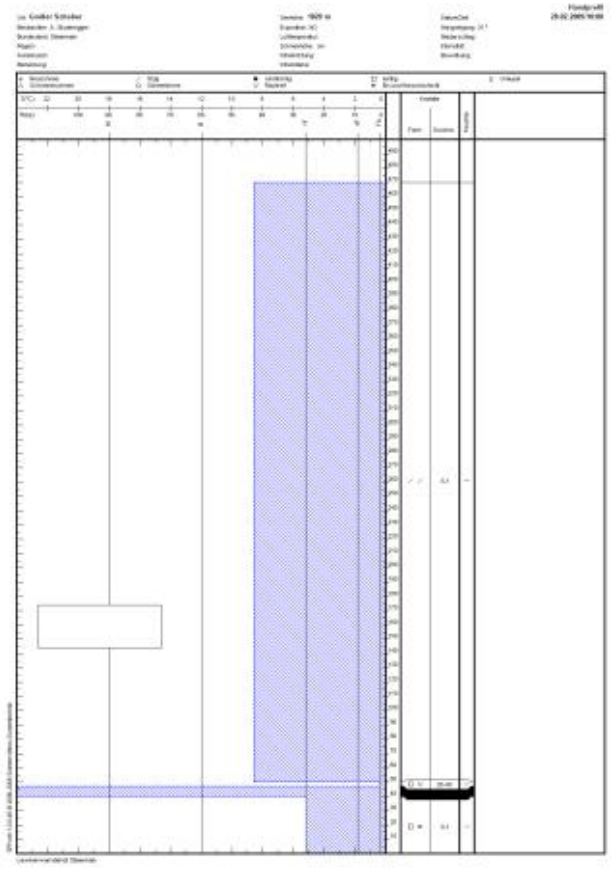

Figure 6: Snow profile of the avalanche Grosser Schober

4. SUMMARY

The winter 2008/09 was very eventfull in the styrian Alps. The second half of February 2009 was particular affected because of the huge amount of snow within these 14 days which had an occurrence time over 100 years. At the 28th of this month many avalanches affected the infrastructure. The main aspects that finally caused such huge avalanches like the one on Mount Schober were great quantity of snow, snow drift and a quick jump in air temperature.

Figure 7: The avalanche track from avalanche starting point

Figure 8: Accumulation area

Figure 9: The railway track was submerged on a length of more than 500 m

5. REFERENCES

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Meteorological data from the Avalanche Service Styria