Basic Avalanche Knowledge and Safe Route Planning - in avalanche terrain
Plan of the day

1. Lecture 1,5 hrs.;
   Basic Avalanche Knowledge and Safe Route Planning -
in avalanche terrain

2. Practical training 2,5 hrs.;
   Companion rescue & Organized rescue
   - Transceiver search
   - Surface search
   - Probe search
   - Digging
3 Axioms / things to remember

1 – Don’t go if you don’t know

2 – Think terrain, not snow

3 – Human factors
Avalanche awareness

Avalanche types

4 types of avalanches:

• Slab
• Loose snow (Point release)
• Cornice fall
• Slushflows (slush avalanches)

Almost all fatal avalanches are slab avalanches
Avalanche awareness

Slab avalanche

1. Starting zone / release area

2. Track / Path

3. Runout / deposition zone / debris
Avalanche awareness
Slab avalanche
Avalanche awareness

Slab avalanches

Foto: M. Indreiten
Avalanche awareness
Loose snow avalanche

Foto: Cryoslope Svalbard
Avalanche awareness
Cornice fall avalanche

Foto: Cryoslope Svalbard
Avalanche awareness

Slush avalanche

Foto: Cryoslope Svalbard

Foto: Svalbardposten
Avalanche awareness

Terrain – steep slopes

- The majority of avalanches occur on slopes between 30°-45°
Release zone

Convex

Concave
Run out zone
Terrain traps

Avalanche paths with very dangerous or un survivable consequences
Terrain trap
Terrain
Summary

Learn to identify:
• Angel of the slope
• Release zones
• Safe zones
• Terrain traps
• Run out zones
Avalanche awareness

Weather

- Wind transport snow
- Temperature (flux)
- Precipitation

Most avalanches occur during and immediately after storms.
Avalanche awareness

Weather

- Wind signs (wind ridges; zastrugi, ripples)
Avalanche awareness
Safe routing

Two options for traveling in avalanche terrain:

1. **The only 100% safe way:**
   - Avoid avalanche terrain – always in dark and bad weather

2. Make planned, safe movements in avalanche terrain
   - Demanding
   - Requires training, knowledge and experience
   - Avoid the release- and, when required, the run-out zones
   - Wrong navigation or a wrong judgment may lead to fatal consequences
Planning
The 4 - factors

The 4 – factors assessment:
• Is this avalanche terrain?
• Is the snowpack unstable?
• Does the weather contribute to instability?
• The human factor:
  How does your needs and experience influence the assessment of weather, terrain and the snowpack?
Planning

Terrain

- Does the slope have a history of sliding?
Planning
Snowpack

• How can we get information about the snowpack?

• Is the snowpack unstable?

• Reduce the risk – evaluate your trip through 3 filters:
  1. Planning prior to the trip
  2. Area evaluation – on tour
  3. Single slope evaluation
Avalanche danger scale

**THIS SCALE INDICATES:** The likelihood of natural and human-triggered avalanches
- How much of the terrain is potentially dangerous
- Expected size of avalanches

**NB! The danger scale is exponential.**
The likelihood of avalanches doubles for each increase in danger level.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>4</td>
<td><strong>HIGH</strong> – Triggering is likely, even from small additional loads. Remote triggering is likely. In some cases, numerous medium-sized and often large natural avalanches can be expected.</td>
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<tr>
<td>3</td>
<td><strong>CONSIDERABLE</strong> – Triggering is possible, even from small additional loads. Remote triggering is possible. In some cases medium-sized, in specific areas large natural avalanches are possible.</td>
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<td>2</td>
<td><strong>MODERATE</strong> – Triggering is possible, particularly from heavy additional loads. Large-sized natural avalanches are unlikely.</td>
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<tr>
<td>1</td>
<td><strong>LOW</strong> – Triggering is generally possible only from heavy additional loads in isolated areas. Only small-sized natural avalanches are possible.</td>
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*Most fatal accidents happen at danger levels 2 and 3. The avalanche is often triggered by the victim themselves.*

**Danger level 5 occurs very rarely** – all travel should be avoided.

Travel in avalanche terrain requires the ability to identify possible avalanche problems and to cope with them. **Avalanche terrain:** Release area > 30° Runout zone ≈ 3 × height of the slope
Red flags – danger signs

- Spontaneous or remotely triggered avalanches
- Obvious avalanche activity – fresh avalanches
Red flags – danger signs

• Recent heavy snowfall (>15 cm)
• Strong wind + loose snow = slab avalanche
Red flags – danger signs

- Rapid warming / rain
- Whoomp-sounds
- Shooting cracks
Planning
Weather

Look for:

Strong Winds
Temp. fluctuations
Large volumes of precipitation
The human factor

- 90% of the avalanches involving humans have been triggered by their own actions

**Attitude:**
People sometimes ignore danger signs due to pride, ego and ambition.

**Time:**
Weekend warrior syndrome.

**Familiarity:**
We take more chances

**Expert halo:**
Personality vs. skills /qualifications

**Blue Sky:**
Sunny weather sometimes draws people out too soon after a storm.

**Herding Instinct:**
People tend to think less in large groups.

«**Tracker dog**»:
People tend to think that tracks in a slope is a safe slope
The human factor

• Be aware of errors groups typically make
• Communication within the group
• Do every one have the basic safety gear?
• Can every one use it? To late to learn it when you are the last person standing.
The human factor
The avalanche has stopped. Those unaffected by the avalanche must immediately start the rescue – TIME IS CRITICAL!
Avalanche rescue
Time is critical

If recovered within 15 minutes, chances of survival are almost 92%

At 35 minutes, survival rate drops to 37%

After that, the success rate is extremely low.
If you are caught in an avalanche

- Yell “Avalanche”, wave your arms to alert the group.
- Try to escape to the side.
- If the slide knocks you over:
  - Try to keep your airway clear of snow
  - Get rid of skis and ski poles
- Try to stay on top
  - «Swim» and FIGHT Hard!

As the slide begins to slow:
- Thrust a hand upward in hopes of being seen
- Try to get an air pocket, Cover your face
- If buried, try to stay calm, breathe slowly and conserve your air.
Primary search area

- Primary search area
- Last-seen point
- Toe of debris pile
- Protruding equipment
- Victim caught
- Most-likely burial area
- Rock
Behavior as a rescuer

1. Watch the avalanche and the victims carefully
2. Remember the point where the victims got captured
3. Try to stay calm and organize the rescue
   - Your own safety?
4. Decide a primary search area
5. Turn your avalanche beacon to «receive», bring your backpack with shovel and probe
6. Search also with your ears and eyes
7. Alert the Police – Sysselmannen

If the victims don’t carry an avalanche beacon:

• Search with ears and eyes
• Alert immediately Sysselmannen
• Probing
Companion rescue
Transceiver search

Depending on access and possibilities:

- Search from the top / bottom in zig-zag patterns (alone)
- Search in strips with 40 m gaps (more rescuers)

DO IT FAST!
Companion rescue
Probing

- Transceiver search probing
- Spot probing
- Organized Probe lines
Shoveling

- Most time consuming part of the rescue!
- V-shape method - Strategic shoveling
- How many rescuers?
- Burial depth?

Foto: M. Indreiten
Avalanche First - Aid

- Dig the head out first
- Check airways
- If the victim cannot breath
- If the victim can breath unassisted
- Extraction of patient
- Protect against further heat loss
- Evacuation

First aid i general:
A(irway) B(reathing) C irculation) D(isability) E(xposure)
Again, remember:

1 – Don’t go if you don’t know

2 – Think terrain, not snow

3 – Human factors
Sources

- [www.varsom.no](http://www.varsom.no)
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- Den lille snøskredboka, Kjetil Brattlien
- Staying alive in avalanche terrain, Bruce Tremper