Avalanche Session

New instructor spreadsheet- We have a new way to track people wanting to become instructors. See Avalanche Program page on nsp.org. They click the link and fill out the form.

Continuing Ed. SAWs, ISSW papers / presentations – Following is a list of current SAWs. See AAA.org for updates. Remember besides formal ICE classes IOR can also conduct literature reviews of ISSW papers and make class content or reports.

Current SAW Schedule, See AAA.org

- October 7-8, 2022 - **Four Corners Snow and Avalanche Workshop** — Silverton, CO
- October 13-14, 2022 - **Colorado Snow & Avalanche Workshop** — Breckenridge, CO
- October 16, 2022 - **Northwest Snow & Avalanche Workshop** - North Bend, WA
- October 21-22, 2022 - **Wyoming Snow & Avalanche Workshop** — Jackson, WY
- October 26, 2022 - **Montana State University Snow and Avalanche Workshop** — Bozeman, MT
- November 2, 7, and 9, 2022 - **Utah Snow & Avalanche Workshop** — Sandy, UT
- November 4, 2022 - **South Central Alaska Avalanche Workshop** — Anchorage, AK
- November 11-12 - **Northern Rockies Snow & Avalanche Workshop** — Whitefish, MT
- November 12, 2022 - **Bend Snow and Avalanche Workshop** — Bend, OR
- Spring 2023 - **Sawtooth Avalanche Center Professional Development Seminar** — Ketchum, ID
- Date TBD - **California Snow & Avalanche Workshop** - Location TBD

National Ski Patrol is a membership-based nonprofit that has been providing avalanche education to ski patrollers and other search and rescue personnel since 1957, making it one of the oldest and most experienced avalanche education associations in North America. NSP offers avalanche education for all backcountry enthusiasts, from the first-time recreationalist to search and rescue professionals.

National Ski Patrol proudly supports the American Avalanche Association's (A3) dedication to avalanche research and education and is aligned with A3's Education Course Structure and Curriculum.

Note: NSP Courses Fully Meet A3's Curriculum But Adds Additional Rescue Oriented Training

To register for a course, please click here.

Become an Avalanche Instructor Click Here
Please refer to the instructor form to see instructor requirements

Programs

- Alumni
- Avalanche
- Awards
- Bike
- Certified
- Instructor Development
- MTR
- Nordic/Backcountry
- OEC
- OET
- OFC
- Safety Team

Avalanche Terrain Evaluation Scale (ATES)

- Discussion of who is using, how, and experiences with ATES
- If you do not use ATES, please do research on it. Very good tool to help students evaluate terrain.
- With regard to Level 1, the IOR can decide if they want to present the “public” version or the “technical” version.

Avalanche Terrain Evaluation Scale

Public Communication Model (v.1- 04)

Description	Class	Terrain Criteria
Simple	**1**	Exposure to low angle or primarily forested terrain. Some forest openings may involve the runout zones of infrequent avalanches. Many options to reduce or eliminate exposure. No glacier travel.
Challenging	**2**	Exposure to well defined avalanche paths, starting zones or terrain traps; options exist to reduce or eliminate exposure with careful routefinding. Glacier travel is straightforward but crevasse hazards may exist.
Complex	**3**	Exposure to multiple overlapping avalanche paths or large expanses of steep, open terrain; multiple avalanche starting zones and terrain traps below; minimal options to reduce exposure. Complicated glacier travel with extensive crevasse bands or icefalls.

Technical Model (v.1- 04)

	1 - Simple	2 - Challenging	3 - Complex
Slope angle	Angles generally < 30º	***Mostly low angle, isolated slopes >35º***	***Variable with large % >35º***
Slope shape	Uniform	Some convexities	Convoluted
Forest density	Primarily treed with some forest openings	Mixed trees and open terrain	Large expanses of open terrain. Isolated tree bands
Terrain traps	Minimal, some creek slopes or cutbanks	Some depressions, gullies and/or overhead avalanche terrain	***Many depressions, gullies, cliffs, hidden slopes above gullies, cornices***
Avalanche frequency (events:years)	1:30 ≥ size 2	1:1 for < size 2 ***1:3 for ≥ size 2***	1:1 < size 3 ***1:1 ≥ size 3***
Start zone density	Limited open terrain	Some open terrain. Isolated avalanche paths leading to valley bottom	Large expanses of open terrain. Multiple avalanche paths leading to valley bottom
Runout zone characteristics	Solitary, well defined areas, smooth transitions, spread deposits	Abrupt transitions or depressions with deep deposits	Multiple converging runout zones, confined deposition area, steep tracks overhead
Interaction with avalanche paths	Runout zones only	Single path or paths with separation	***Numerous and overlapping paths***
Route options	Numerous, terrain allows multiple choices	A selection of choices of varying exposure, options to avoid avalanche paths	***Limited chances to reduce exposure, avoidance not possible***
Exposure time	None, or limited exposure crossing runouts only	***Isolated exposure to start zones and tracks***	***Frequent exposure to start zones and tracks***
Glaciation	None	***Generally smooth with isolated bands of crevasses***	***Broken or steep sections of crevasses, icefalls or serac exposure***

Regional Data:
Avalanche Hazard/Danger Forecast

North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size and distribution of avalanches.

Danger Level		Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme		Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High		Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 Considerable		Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 Moderate		Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 Low		Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Safe backcountry travel requires training and experience. You control your own risk by choosing where, when and how you travel.

Nat Hazards (2018) 90:663–691
https://doi.org/10.1007/s11069-017-3070-5

ORIGINAL PAPER

A conceptual model of avalanche hazard

Grant Statham[1] · Pascal Haegeli[2,3] · Ethan Greene[5] · Karl Birkeland[4] · Clair Israelson[6] · Bruce Tremper[7] · Chris Stethem[8] · Bruce McMahon[9] · Brad White[1] · John Kelly[6]

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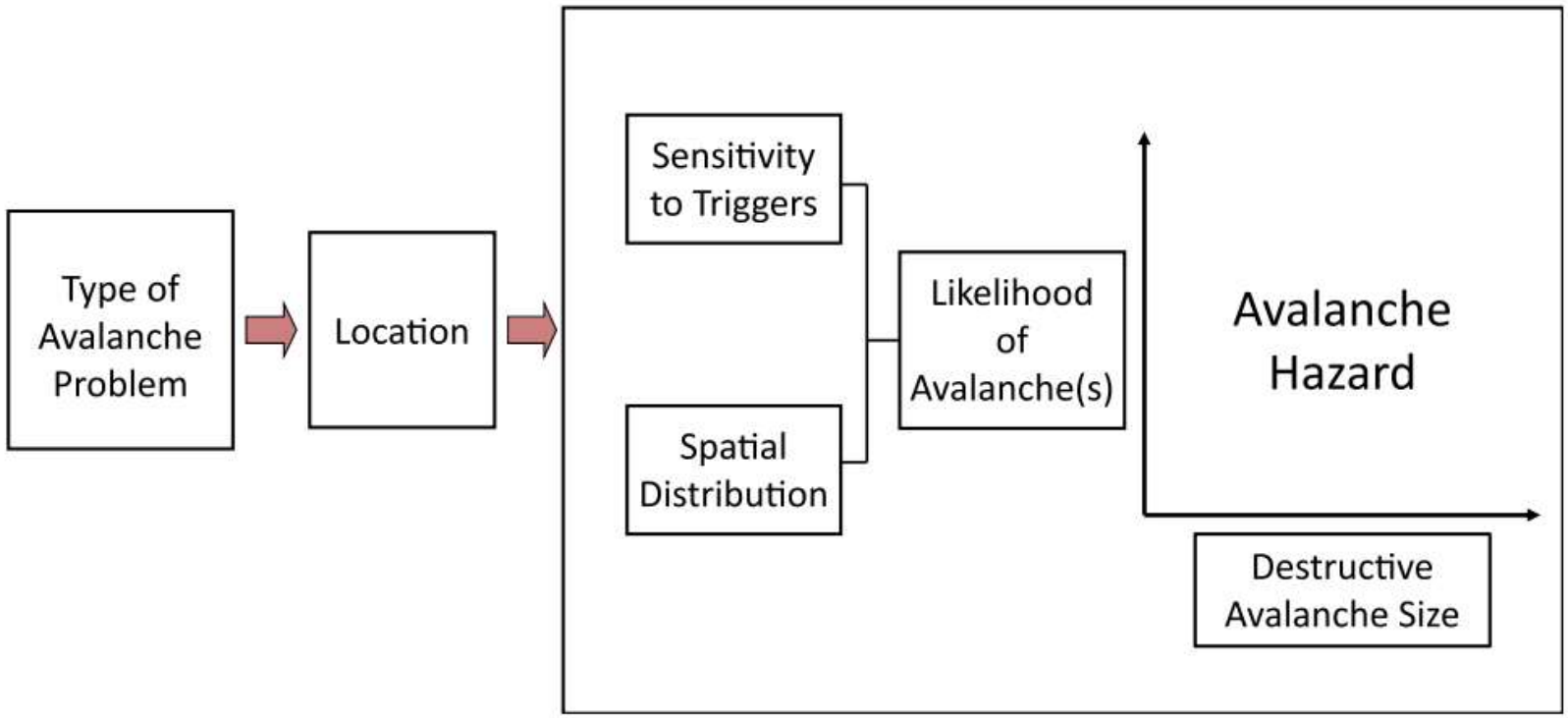
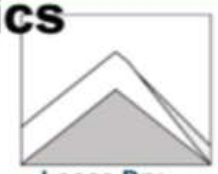


Fig. 1 Structure of an avalanche problem. Each problem is defined by its *type*, *location*, *likelihood* and *size*

Avalanche Basics

Avalanche Types

Most Predictable


Loose Dry


Storm Slab


Wind Slab

Less Predictable

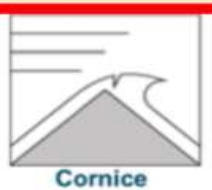

Persistent Slab


Deep Persistent Slab


Loose Wet

Least Predictable


Wet Slab


Cornice


Glide

missoulaavalanche.org

Why Evaluate Avalanche Types?

- Often contains information about terrain, likelihood and size
- Provides a filter as to future decisions:
  - Some types propagate more, thus impacting terrain selection and travel
  - Some types are in high elevation, again selecting travel
  - Deep slabs vs. storm slabs, implies size and consequences
  - Different explosive placements
  - What observations are most relevant for our problem type?
  - What testing?
- Several types may exist- what is most concerning?

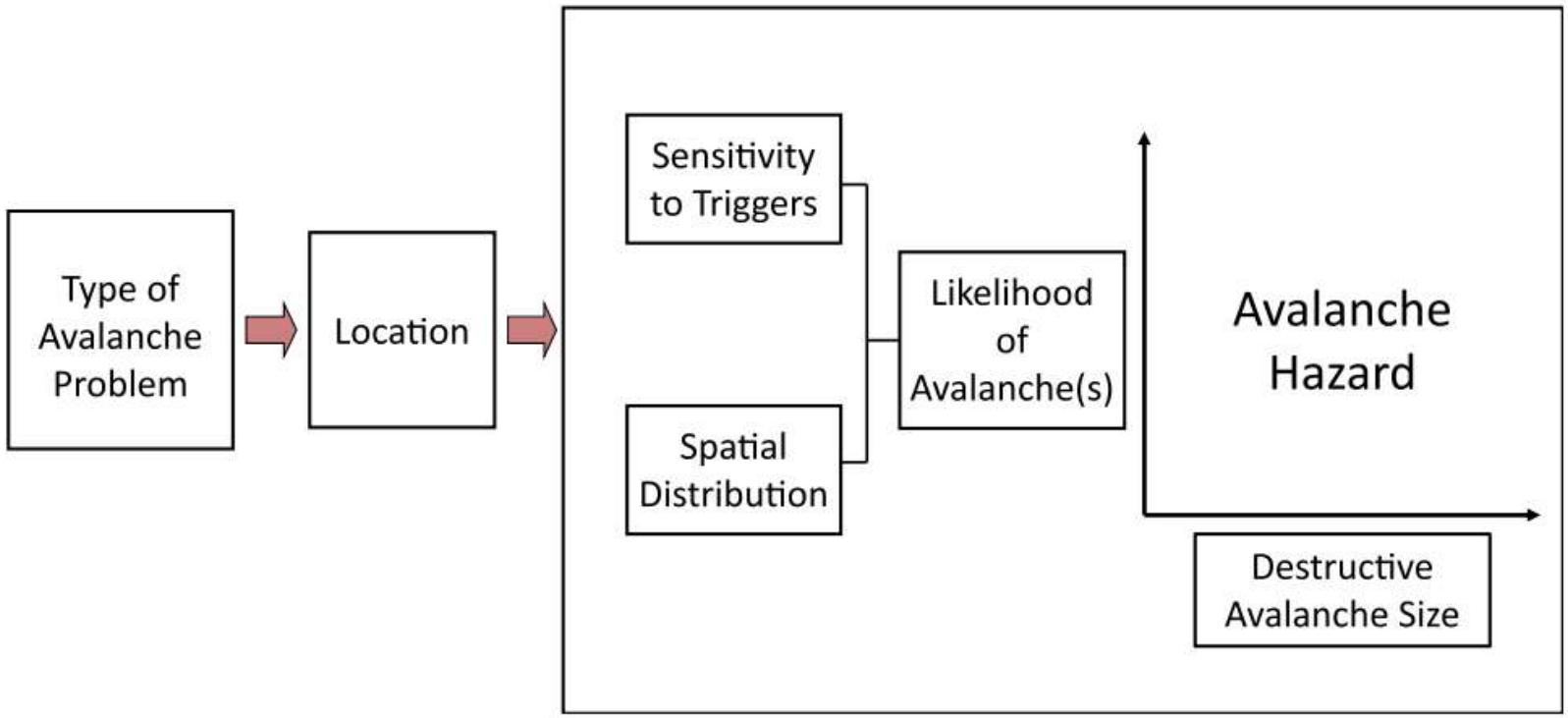


Fig. 1 Structure of an avalanche problem. Each problem is defined by its *type*, *location*, *likelihood* and *size*

Location- In what terrain is the problem found?

- We have historically done a good job around identifying avalanche terrain, terrain traps, and how weather, aspect, elevation play a role
- Adding the focus of a problem type lets us better focus on terrain selection and avoidance.

This is starting to make more “answerable” questions when trip planning.

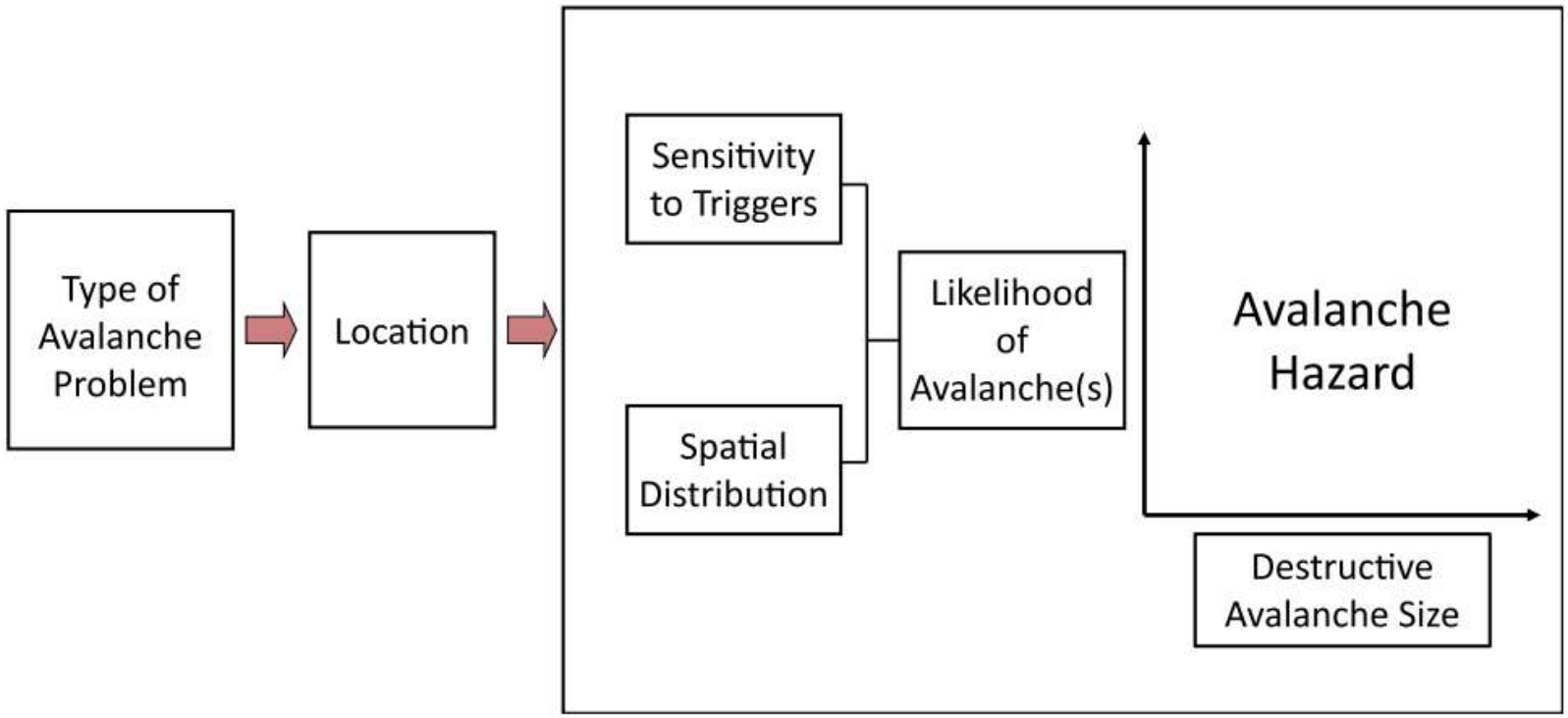


Fig. 1 Structure of an avalanche problem. Each problem is defined by its *type*, *location*, *likelihood* and *size*

Likelihood: two parts Independent of each other

- Sensitivity to Triggering
  - Unreactive to touchy – Four level scale (see the paper)

- Spatial Distribution
  - Some problem types are easy to find evidence on, some are very isolated
  - Isolated to widespread (see the paper)

  Again- these will easily filter into trip planning and provide informed decisions

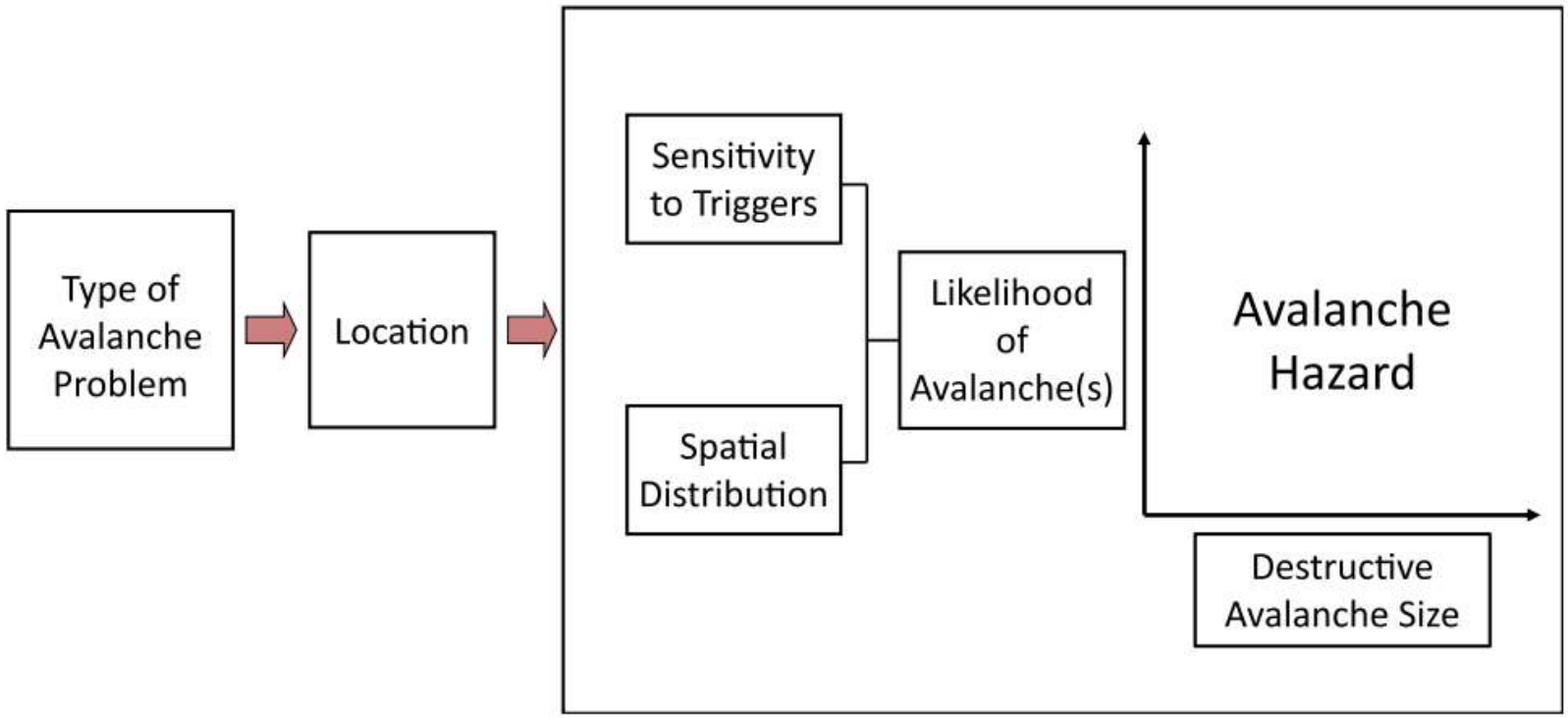
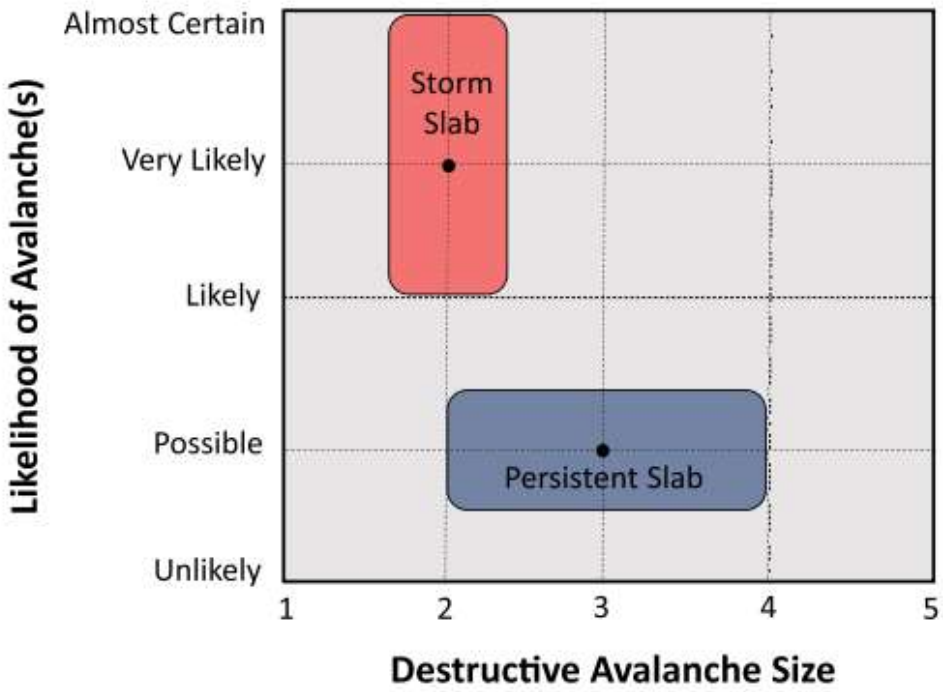


Fig. 1 Structure of an avalanche problem. Each problem is defined by its *type*, *location*, *likelihood* and *size*

Destructive Size

- Avalanche problem type
- Terrain type (ATES)
- Snowpack depth



All factors that can impact size (D-scale)

Avalanche Problem(s) for Local / Ski Touring Area:

Avalanche Danger Assessment:

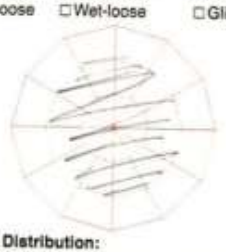
1) Identify *avalanche problem for the local area targeted for travel.*

2) Prioritize *avalanche problems; What are the primary two concerns?*

Uncertainty analysis, identification of terrain to avoid, danger rating assignment, and risk analysis will be completed for the primary concerns in the next page.

Problem #1:

☑ Storm Slab ☐ Persistent Slab ☐ Wind Slab
☐ Wet Slab ☐ Deep Slab ☐ Cornice
☐ Dry-loose ☐ Wet-loose ☐ Glide



Spatial Distribution:

☑ Widespread ☐ Specific ☐ Isolated

Sensitivity:

☐ Unreactive ☐ Stubborn
☑ Reactive ☐ Touchy

Problem #2:

☐ Storm Slab ☑ Persistent Slab ☐ Wind Slab
☐ Wet Slab ☐ Deep Slab ☐ Cornice
☐ Dry-loose ☐ Wet-loose ☐ Glide

60-80 cm

Spatial Distribution:

☑ Widespread ☐ Specific ☐ Isolated

Sensitivity:

☐ Unreactive ☐ Stubborn
☑ Reactive ☐ Touchy

Problem #3:

☐ Storm Slab ☐ Persistent Slab ☑ Wind Slab
☐ Wet Slab ☐ Deep Slab ☐ Cornice
☐ Dry-loose ☐ Wet-loose ☐ Glide

Spatial Distribution:

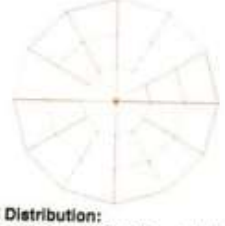
☐ Widespread ☑ Specific ☐ Isolated

Sensitivity:

☐ Unreactive ☐ Stubborn
☑ Reactive ☐ Touchy

Problem #4:

☐ Storm Slab ☐ Persistent Slab ☐ Wind Slab
☐ Wet Slab ☐ Deep Slab ☐ Cornice
☐ Dry-loose ☐ Wet-loose ☐ Glide



Spatial Distribution:

☐ Widespread ☐ Specific ☐ Isolated

Sensitivity:

☐ Unreactive ☐ Stubborn
☐ Reactive ☐ Touchy

Risk Assessment for Local / Ski Touring Area:

Uncertainty Factors & Danger Rating for Problem #1 Storm Slab

Weak Layer: ☑ Precipitation Crystals ☐ Facets ☐ Surface Hoar ☐ Melt-freeze ☐ Unknown
Instability Trend: ☐ Decreasing ☐ Steady ☑ Increasing and PWL
Instability Type: ☑ Typical ☐ Rare ☐ Unprecedented
Liquid Water: ☐ No ☐ Yes ☐ Unknown
Spatial Variability: ☑ Uniform ☐ Variable ☐ Random/chaotic
Travel Terrain: ☑ Simple ☐ Challenging ☐ Complex
Rating: ☐ Low ☐ Moderate ☐ Considerable ☑ High
Confidence: ☑ High ☐ Moderate ☐ Low

Areas to Avoid:

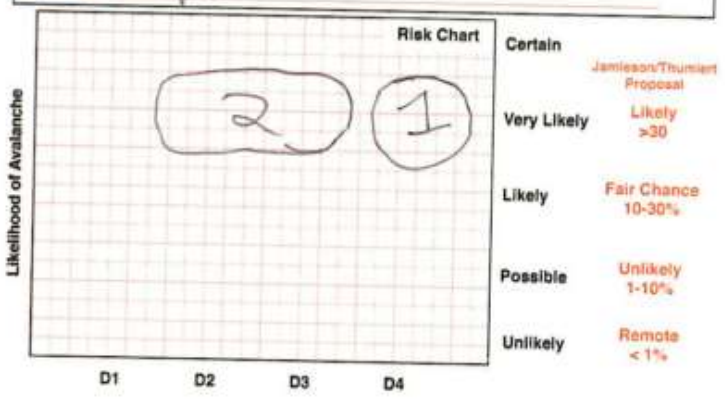
Slope angle: 30+ Aspect: All Elevation: +Catt [m feet]
Terrain type: All

Uncertainty Factors & Danger Rating for Problem #2 Wind

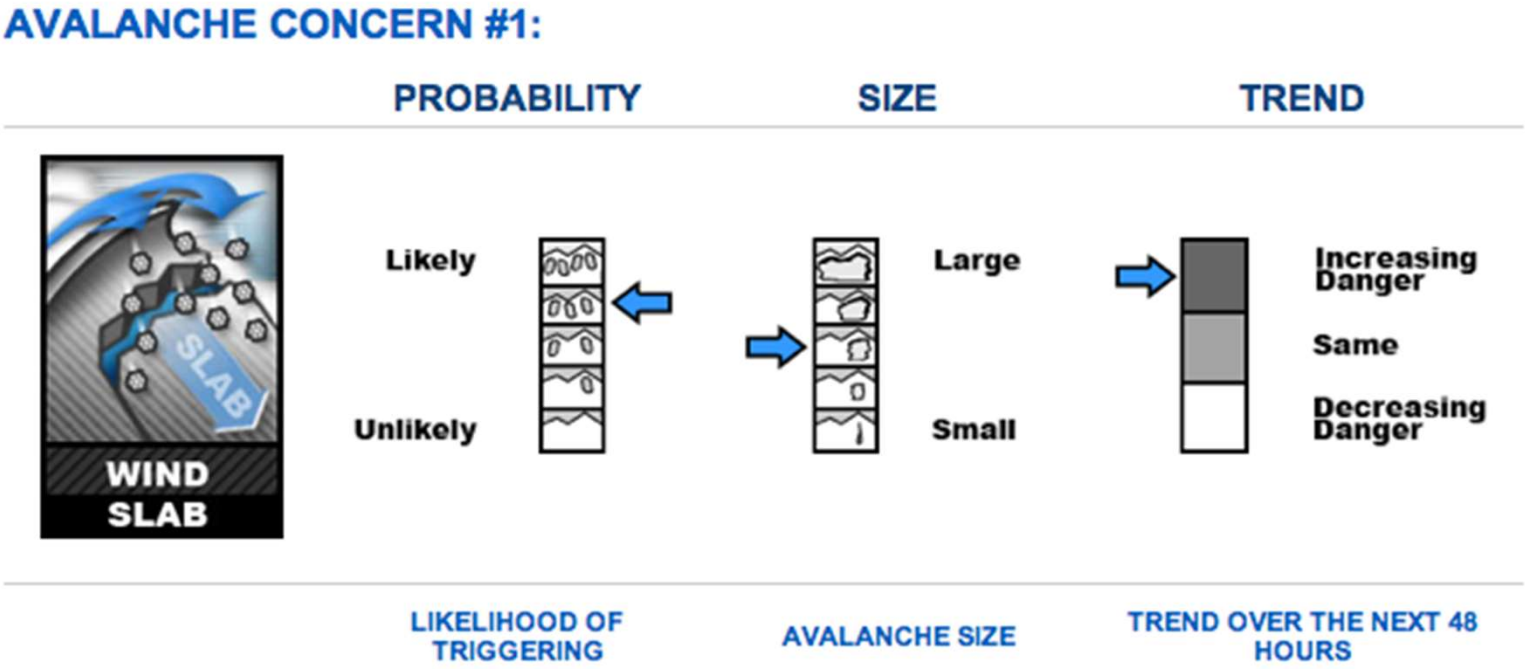
Weak Layer: ☐ Precipitation Crystals ☐ Facets ☐ Surface Hoar ☐ Melt-freeze ☐ Unknown
Instability Trend: ☐ Decreasing ☐ Steady ☑ Increasing
Instability Type: ☑ Typical ☐ Rare ☐ Unprecedented
Liquid Water: ☑ No ☐ Yes ☐ Unknown
Spatial Variability: ☑ Uniform ☐ Variable ☐ Random/chaotic
Travel Terrain: ☐ Simple ☑ Challenging ☐ Complex
Rating: ☐ Low ☐ Moderate ☐ Considerable ☑ High
Confidence: ☑ High ☐ Moderate ☐ Low

Areas to Avoid:

Slope angle: Aspect: SW-NE Elevation: Ridge/Ridges [m feet]
Terrain type: Tops



Regional Data:
Avalanche Hazard/Danger Forecast



Regional Data:
Avalanche Hazard/Danger Forecast