



## Agenda

### Sunday, 10/20

1:00 – 7:00 pm	Registration Desk Open	Hotel Lobby
7:00 – 7:50 pm	Introduction & Welcome An Operational Case Study <i>Mike Ferrari</i>	Sego Lily Ballroom
7:50 – 8:30 pm	Recent Advances in Our Scientific Understanding of Avalanches: Merging Theory & Practice <i>Karl Birkeland</i>	Sego Lily Ballroom
8:30 – 9:45 pm	Meet & Greet Reception	Sego Lily Foyer

### Monday, 10/21

8:00 – 8:30 am	Announcements <b>The Avalanche Hazard Conceptual Model</b> <i>Bruce Tremper</i> Between 2008 and 2010, a committee of avalanche program leaders from both the U.S. and Canada met regularly to hammer out the basic concepts and components of avalanche hazard and risk. What is avalanche hazard? What is avalanche risk? What are the components of avalanche hazard and risk? Most of us only had a vague, intuitive notion of what they were and how they worked. We first had to come up to speed on the international standards used to describe hazard and risk in other natural hazards fields. Then we came up with an overall, conceptual model of hazard and risk that would work for all aspects of the avalanche community.  This conceptual model has since become the industry standard in how we deal with avalanches and communicate with each other about avalanches, and it has also been adopted outside of North America as well. This lecture covers all the aspects of the Conceptual Model including: <ul style="list-style-type: none"> <li>• Avalanche Character</li> <li>• Avalanche Problems</li> <li>• Avalanche Hazard</li> <li>• Avalanche Risk</li> </ul>	Sego Lily Ballroom
8:30 – 9:15 am	<b>Mountain Snowpack – Part 1</b> <i>Ethan Greene</i> This lecture covers the growth and decay of ice crystals as it pertains to snow layer formation and avalanche release. We will discuss the mechanisms of snow metamorphism and how they manifest into three regimes, how to identify the structures created by each regime, and how they create the ingredients of an avalanche. We will also discuss a few special cases with practical implications for avalanche forecasting as well as how snow layers vary in both time and space. We will also briefly touch on the concepts of snow creep, glide, and settlement.	Sego Lily Ballroom
9:15 – 9:30 am	Break	
9:30 – 10:00 am	<b>Mountain Snowpack – Part 2</b> <i>Ethan Greene</i> A continuation of the previous lecture.	Sego Lily Ballroom
10:00 – 10:15 am	Break (move to workshops)	
10:15 – 11:45 am	<b>Workshop – Mountain Snowpack</b>	Various Rooms
11:45 – 12:45 pm	Lunch (on own)	
12:45 – 1:45 pm	<b>Avalanche Formation &amp; Release</b> <i>Karl Birkeland</i> A basic understanding of how avalanches are triggered is critically important for safe travel in avalanche terrain. Although every detail is not perfectly understood, fracture mechanics provide a solid framework for us to better understand avalanche release. This lecture will look at the mechanical properties of snow slabs, will briefly touch on a recent avalanche release model, and will emphasize the practical implications of the most recent research. We will also learn about the spatially variable nature of the snowpack, and the implications of that variability for avalanche forecasting and mitigation.	Sego Lily Ballroom
1:45 – 2:00 pm	Break	

2:00 – 3:00 pm **Snow Profiles, Stability Tests & Interpretation** Sego Lily Ballroom  
*Doug Chabot*  
 In order to ascertain avalanche danger we need to gather information on the structure and stability of the snowpack. This lecture will cover general snowpack observations and the recording of snowpit and stability test data following SWAG. Students will learn how to measure and record information in the field, create snow profiles and perform various stability tests. Additionally, we will discuss how to interpret our test results which is a difficult process for any practitioner.

3:00 – 3:30 pm **Expectations of a Snow Safety Director** Sego Lily Ballroom  
*Dave Richards*

3:30 – 3:45 pm **Break (move to workshop)** Various Rooms

3:45 – 5:00 pm **Workshop – Drafting & Interpreting Snowpit Profiles**

## Tuesday, 10/22

8:00 – 8:45 am **Announcements**  
**Mountain Weather Impacts on Snowpack** Sego Lily Ballroom  
*Mark Staples*

Basic facts about weather that are pertinent for avalanche professionals will be described. Emphasis will be placed on how the weather affects the snowpack versus how to forecast weather. Students will be guided through basic calculations such as PI, SI, SWE and snow density—valuable information that is a daily part of operational work and forecasting.

8:45 – 9:30 am **Weather & Avalanche Data Collection, Recording & Display** Sego Lily Ballroom  
*Mike Rheam*

Weather data has become easily accessible to anyone with a smartphone or a laptop, and is a vital part of any avalanche operation. But with the volume of data available, how can individuals and organizations manage this information and make sense of it all? This lecture will cover the different types of weather data used in avalanche operations and where it comes from. Students will learn how to readily interpret the data displays and to apply this information in the real world of avalanche work. How this information is organized at an operational level and communicated to staff will be emphasized. Operational use of programs like Smart Mountain and InfoEX will be examined.

9:30 – 9:45 am **Break (move to workshop)**

9:45 – 11:30 am **Workshop – Weather Data Calculations (45 min)** Various Rooms  
**Workshop – Avalanche Release Exercise (1 hr)**

11:30 – 12:30 pm **Lunch (on own)**

12:30 – 1:30 pm **Avalanche Hazard Evaluation—Practical Applications** Sego Lily Ballroom  
*Bruce Tremper*

As professional avalanche workers, evaluating avalanche hazard is obviously an extremely important skill. We accomplish this through a number of standard techniques and procedures developed by avalanche professionals through science and many years of trial-and-error experience. This lecture covers the practical basics of:

- What kind of avalanche character we are dealing?
- What is its distribution?
- How sensitive is it to triggers?
- What is the expected destructive size?
- What is our strategic mindset
- What are our mitigation measures?

We do this through observation of avalanche activity, snow surface conditions, snow profile tests, explosive tests and test slopes, weather observation and weather forecasts. Finally, after we have gathered the evidence, what is our strategic mind set—our overall strategy for managing the hazard?

1:30 – 1:45 pm **Break**

1:45 – 2:45 pm **Decision Making for Avalanche Professionals** Sego Lily Ballroom  
*Scott Savage*

This lecture will introduce decision-making theory and will explain why it matters to avalanche professionals. It will review common decision-making errors made by avalanche professionals. It will cover methods, techniques, and tools to improve decision-making. Inbounds avalanche hazard mitigation related incidents will also be introduced and covered more in-depth in other lectures.

2:45 – 3:30 pm **Where Professionals Make Mistakes** Sego Lily Ballroom  
*Chris McCollister*

This presentation is designed to educate students on common errors avalanche professionals have made during their careers and how to avoid them. We will spend time reviewing Todd Guyn's ISSW 2016 paper "10 Common Missteps of Avalanche Practitioners." After which we will examine three case studies to determine which of the "missteps" are applicable and how they could have affected the outcomes.

3:30 – 3:45 pm **Break (move to workshop)**

3:45 – 5:15 pm	<b>Workshop – Avalanche Hazard Evaluation</b>	Various Rooms
5:30 – 6:30 pm	Optional Session: Clarification & Review <i>Karl Birkeland &amp; Mike Ferrari</i>	Sego Lily Ballroom

### Wednesday, 10/23

8:00 – 9:00 am	Announcements <b>Explosives &amp; the Snowpack</b> <i>Scott Savage</i> This lecture will cover the concept of detonation and examine how detonations impact a seasonal snowpack. Energy, detonation velocity, detonation pressure, and attenuation will be discussed. The lecture will cover different types of explosives and introduce common explosive delivery methods. Subsequent lectures will examine operational applications and problems in greater detail.	Sego Lily Ballroom
9:00 – 9:10 am	Break	
9:10 – 10:00 am	<b>Avalanche Protection Fundamentals</b> <i>Paul Baugher</i> Avalanche Protection Fundamentals are the core principals and techniques used to reduce avalanche risks in an operational setting. The discussion will begin with the basic elements of identifying the risk to life and property and designing an appropriate protection scheme that is not too risky and not too conservative or impractical.  Strategies for protection, both active and passive, will be examined. The benefits and limitations of a variety of avalanche hazard reduction techniques, including the use of explosives will be discussed.	Sego Lily Ballroom
10:00 – 10:10 am	Break	
10:10 – 11:10 am	<b>Ski Area Operations</b> <i>Paul Baugher</i> Inbounds avalanches and other issues facing ski area operations will be discussed. This will include selected case studies demonstrating forecasting and mitigation for deep and/or persistent slab structure and post control release.  Boundary management and communicating the risk of inbounds avalanches to ski area guests will also be covered. A brief discussion of legal implications for ski area avalanche operations will also be addressed. A short explanation of the snow immersion suffocation (SIS) phenomenon and some basic safety considerations will conclude the presentation.	Sego Lily Ballroom
11:10 – 11:20 am	Break (move to workshop)	
11:20 – 12:30 pm	<b>Workshop – Operational Avalanche Programs</b>	Various Rooms
12:30 – 1:30 pm	Lunch (on own)	
1:30 – 2:30 pm	<b>Operational Avalanche Rescue</b> <i>Lel Tone</i> Planning for self-rescue or companion rescue is fairly simple. Planning for formal rescue by dedicated organizations is more complex and requires a written rescue plan that details how equipment and human resources will be utilized. This session will provide guidelines for planning and implementing formalized rescue plans, focusing on ski area operations and real world examples.	Sego Lily Ballroom
2:30 – 2:45 pm	Break (move to workshop)	
2:45 – 3:30 pm	<b>WRITTEN QUIZ – Final Exam Part 1</b> Mountain Snowpack, Avalanche Formation & Release	Various Rooms
3:30 – 4:00 pm	POST QUIZ – REVIEW OF ANSWERS	
4:00 – 4:45 pm	2018-2019 Review: Colorado's Historic Avalanche Season <i>Ethan Greene</i>	Sego Lily Ballroom
4:45 – 5:15 pm	My Life as a Forecaster and Heli-Ski Guide <i>Lel Tone</i>	Sego Lily Ballroom
5:15 – 5:30 pm	US Forest Service <i>Sean Wetterberg &amp; Mark Staples</i>	Sego Lily Ballroom
5:30 – 7:00 pm	<b>Trade Show Reception</b>	Sego Lily Foyer

## Thursday, 10/24

	Announcements	
8:00 am – 9:00 am	<b>Avalanche Rescue Technology</b> <i>Dale Atkins</i> Avalanche rescues can range from simple to complex, and technology can play crucial roles in all phases of avalanche search and rescue/recovery to make rescues easier, faster, and potentially safer for rescuers, too. While technology can benefit rescuers and avalanche victims it can also hinder avalanche rescues. This lecture will address the changing dimensions of avalanche rescue and discuss the use of technologies within a modern framework of a systems approach to avalanche rescue. Students will learn how technology has shifted interventions from search/find to rescue/save of avalanche victims. We will discuss the advantages and disadvantages to using various devices, and the implications and how to manage distracting signals and signal interferences.	Sego Lily Ballroom
9:00 – 9:10 am	Break (move to workshop)	
9:10 – 10:10 am	<b>WRITTEN QUIZ – Final Exam Part 2</b> Snowpits: Drawing & Interpreting Weather Data: Interpretation & Basic Calculations	Various Rooms
10:10 – 10:50 am	POST QUIZ – REVIEW OF ANSWERS	
10:50 – 11:00 am	Break (return to ballroom)	
11:00 – 12:00 pm	<b>Wet Snow &amp; Wet Snow Avalanches</b> <i>Simon Trautman</i> How water affects the relative stability, or instability, of seasonal snowpacks is an important part in the avoidance, or mitigation, of snow avalanches. This lecture illustrates how liquid water changes the physical properties of snow and presents a framework used to depict the wet snow system. In addition, we will discuss various types of wet snow avalanches and some practical applications and forecasting techniques that are useful in that regard.	Sego Lily Ballroom
12:00 – 1:00 pm	Lunch (on own)	
1:00 – 1:45 pm	<b>Difficult Avalanche Problems in a Changing Climate</b> <i>Karl Birkeland</i> Changing snowfall patterns over the coming decades will change the avalanches we observe. This talk briefly discusses some recent climate change research that shows a shortening snow season length and more persistent weather patterns, both of which may affect the types of avalanche challenges facing avalanche professionals.	Sego Lily Ballroom
1:45 – 2:15 pm	NAS Field Session Preview & Expectations <i>AAI Staff</i>	Sego Lily Ballroom
2:15 – 2:30 pm	Break	
2:15 – 4:00 pm	Closing Remarks <i>Mike Ferrari</i> <b>FINAL EXAM Part 3</b> (Multiple Choice)	Sego Lily Ballroom
4:00 pm	Departure	