NATIONAL AVALANCHE FOUNDATION

**25th National Avalanche School**
**Classroom Session**
**Breckenridge, CO**
**October 22-26, 2017**

# 2017 Classroom Agenda

## Sunday, 10/22

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|---|---|---|
| 1:00 – 7:00 pm | Registration Desk Open | 3rd Floor Foyer |
| 7:00 – 8:30 pm | Introduction & Welcome<br>An Operational Case Study<br>*Paul Baugher* | Colorado Ballroom |
| 8:30 – 9:45 pm | Meet & Greet Reception | Coppertop III |

## Monday, 10/23

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| | Announcements | |
| 8:00 – 8:30 am | The Avalanche Hazard & Risk Conceptual Model<br>*Bruce Tremper* | Colorado Ballroom |

This conceptual model has become the industry standard in how we deal with avalanches and communicate with each other about avalanches. It has also been adopted outside of North America. This lecture covers all the aspects of the Conceptual Model including:

- Avalanche Character
- Avalanche Problems
- Avalanche Hazard
- Avalanche Risk

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| 8:30 – 8:45 am | Break | 3rd Floor Foyer |
| 8:45 – 10:00 am | Mountain Snowpack<br>*Ethan Greene* | Colorado Ballroom |

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 briefly touch on the concepts of snow creep, glide, and settlement.

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| 10:00 – 10:15 am | Break (move to workshops) | |
| 10:15 – 11:45 am | Workshop–Mountain Snowpack | Various Rooms |
| 11:45 – 12:45 pm | Lunch (on own) | |
| 12:45 – 1:45 pm | Avalanche Formation & Release<br>*Karl Birkeland* | Colorado Ballroom |

A basic understanding of how avalanches are triggered is critically important for safe travel in avalanche terrain. Although the physics behind avalanche release is not fully understood, fracture mechanics still provide a solid framework for us to better understand avalanche release. This lecture will look at the mechanical properties of snow slabs, will introduce a model of avalanche release, and will discuss the evidence supporting that model. We will also learn about the spatially variable nature of the snowpack, and the implications of that variability for avalanche forecasting and mitigation.

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| 1:45 – 2:00 pm | Break | 3rd Floor Foyer |
| 2:00 – 3:00 pm | Snow Profiles, Snow Pit Tests & Interpretation<br>*Doug Chabot* | Colorado Ballroom |

In order to ascertain avalanche danger we need to gather information on the structure and stability of the snowpack. This lecture will teach us about general snowpack observations and the recording of snowpit and stability test data following SWAG. I will discuss 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.

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| 3:00 – 3:15 pm | Break (move to workshop) | Various Rooms |
| 3:15 – 4:45 pm | Workshop– Drafting and Interpreting Snowpit Profiles<br>Review Prework, New Exercises | |

## Tuesday, 10/24

Announcements

8:00 – 8:30 am — Mountain Weather Facts — Colorado Ballroom

*Instructor to be announced*

Basic facts about weather that are pertinent for avalanche professionals will be described. 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.

8:30 – 8:45 am — Break

8:45 – 9:45 am — Weather Data Collection & Display — Colorado Ballroom

*Andy Lapkass*

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 to make sense of it all? This lecture will cover the different types of weather data used in avalanche operations and where it comes from. The student will learn how to readily interpret the data displays and to apply this information in the real world of avalanche work. What does this weather data tell you (or not tell you), about avalanche conditions? Students will also be exposed to the concept of forecasting thresholds by examining real-life scenarios.

9:45 – 10:00 am — Break (move to workshop)

10:00 – 11:45 am — Workshop– Basic Weather Calculations (45 min) — Various Rooms
Avalanche Release Exercise (1 hr)

11:45 – 12:45 pm — Lunch (on own)

12:45 – 1:45 pm — Avalanche Hazard Evaluation–Practical Applications — Colorado 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 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?

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?

1:45 – 2:00 pm — Break — 3rd Floor Foyer

2:00 – 3:00 pm — Explosives & the Snowpack — Colorado Ballroom

*Scott Savage*

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.

3:00 – 3:15 pm — Break (move to workshop)

3:15 – 4:45 pm — Workshop–Avalanche Hazard Evaluation — Various Rooms

Using the framework of the Avalanche Hazard Conceptual Model to describe conditions and hazard

5:00 – 6:00 pm — Optional Session: Clarification & Review — Colorado Ballroom

*Karl Birkeland & Janet Kellam*

## Wednesday, 10/25

Announcements

8:00 – 9:00 am — Avalanche Protection Fundamentals — Colorado Ballroom

*Paul Baugher*

Avalanche Protection Fundamentals are the core principals used to reduce and manage 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.

Ski Area Avalanche Plans and 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.

9:00 – 9:15 am — Break — 3rd Floor Foyer

9:15 – 10:05 am — Terrain–Where Professional Mistakes are Made — Colorado Ballroom

*Chris McCollister*

Case Studies that help us understand the challenges of terrain, avalanche conditions and professional avalanche work.

## Wednesday, 10/25 - continued

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| 10:05 – 11:00 am | Ski Area Operations<br>*Paul Baugher*<br>Examples of issues facing ski area operations will be discussed including forecasting and mitigation for deep or persistent slab structure, post control release, and boundary management, Communicating the risk of inbounds avalanches to ski area guests and the legal implications will be addressed.<br>The lecture concludes with some basic safety considerations and a brief description of the snow immersion suffocation (SIS) phenomenon | |
| 11:00 – 11:15 am | Break (move to workshop) | |
| 11:15 – 12:30 pm | Workshop–Operational Avalanche Programs | Various Rooms |
| 12:30 – 1:30 pm | Lunch (on own) | |
| 1:30 – 2:30 pm | Operational Avalanche Rescue<br>*Mike Rheam*<br>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. | Colorado Ballroom |
| 2:30 – 2:45 pm | Break (move to workshop) | |
| 2:45 – 3:45 pm | WRITTEN QUIZ – Final Exam Part 1<br>Mountain Snowpack, Avalanche Release | Various Rooms |
| 3:45 – 4:30 pm | POST QUIZ- REVIEW OF ANSWERS | |
| 4:45 – 5:45 pm | Optional Lecture: Advanced Weather Tools<br>*Ethan Greene* | Colorado Ballroom |
| 6:00 – 7:30 pm | Trade Show Reception | 3rd Floor Foyer |

## Thursday, 10/26

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| | Announcements | |
| 8:00 am – 8:50 am | Avalanche Rescue Technology<br>*Dale Atkins*<br>Students will be introduced to the latest perspectives, knowledge, and application of avalanche rescue technologies. | Colorado Ballroom |
| 8:50 – 9:05 am | Break (move to workshop) | |
| 9:05 – 10:05 am | WRITTEN QUIZ – Final Exam Part 2<br>Snowpits: drawing and interpreting, Weather Data: interpretation & basic calculations | Various Rooms |
| 10:05 – 10:50am | POST QUIZ – REVIEW OF ANSWERS | |
| 10:50 – 11:00 am | Break (return to ballroom) | |
| 11:00 – 12:00 pm | Wet Snow & Wet Avalanches<br>*Simon Trautman*<br>Water is a common occurrence in seasonal snowpacks and understanding its relationship with the relative stability, or instability, of snowpacks is an important part in the avoidance, or mitigation, of snow avalanches. This lecture illustrates how water affects the physical properties of snow and presents a framework used to depict the wet snow system. In addition, we will discuss various types of avalanches associated with the presence of water in the snowpack and practical applications and forecasting techniques that are useful in wet snow scenarios | Colorado Ballroom |
| 12:00 – 1:00 pm | Lunch (on own) | |
| 1:00 – 2:00 pm | Difficult Avalanche Problems<br>*Karl Birkeland*<br>The science behind deep persistent slab, post control release | Colorado Ballroom |
| 2:00 – 2:15 pm | Break | |
| 2:15 – 4:00 pm | Professional Training in the US–update, Field Session Preview<br>Closing remarks<br>FINAL EXAM Part 3 (Multiple Choice) | Colorado Ballroom |