TESTING THE SNOWPACK IN THE FIELD

- What avalanche problems are you dealing with?
- Where are these problems located?

Informal Stability Tests

- Pole Test
- Hand Shear
- Switchback Test
- Jump on a small rollover

All of these are looking for a recipe for an avalanche and how reactive that recipe is.

SNOW PITS

Introduction:

What do you expect to find?

- Have a defined goal for the hole you dig – Know what information you are looking for.
- Develop a routine and stick with it.
- The big picture. Remember that you are looking at one small spot in a very large world. Your extrapolation to the larger picture should depend more upon your general observations.

Spending less time in more locations is far better than spending more time in one location.

General Snow Pit Guidelines

1. Choose appropriate pit locations. Safe, representative, and polite. Look for areas with average snow cover or target weak areas. Avoid large wind pillows, which tell you little about the slope.
2. Probe your pit area for potentially buried rocks and trees.
3. Do your crystal ID, hand hardness, and temperatures on a shaded side wall. The snow will change less rapidly and will leave the front wall open for stability tests
4. Brush your front wall with diagonal strokes to bring out layering, brush your side wall with vertical strokes to bring out layering.
5. Fill in your pit when you are done, so the next storm can fill in and round over any edges.
6. This is one data point. Don't use only one piece of information to make an assessment or decision.

Study/Data Pit:

30-45 minutes

A study pit provides a snap shot of the season history and current trends within the snowpack. A series of study pits in the same location can provide a picture of changes in snow strength over time. Study Pits need not be on angled slopes, but should be in well-protected areas that see minimal effects of sun and wind. Typical objectives include:

- **Layer ID** – grain identification and size for each layer.
- **Metamorphic trends** – via temperature profile and visual inspection of grains.
- **Bond Strength** – connections between snow grains via hand hardness test
- **Snowpack history** – a history of the weather that created the snowpack can be inferred.
- **Density** - measurements may be conducted to calculate the snow water equivalent of the snowpack, or to calculate the load of snow over a given weak layer

Study Pit Examination

You will have 1 hour to complete your test post shoveling (which you will get 5-10 minutes for). Your snow pit will be 100-150 cm deep.

In 60 minutes, you must complete:

- Layer ID – grain type, grain size, layer hardness
- Temperature profile – every 10 cm
- Small column stability test – compression test
- Large column stability test – extended column test (or propagation saw test if appropriate)
- Document the full profile and test results

Notify instructors when you are doing your stability tests so they can observe them.

Do not fill in your pit until an instructor looks at the snowpack stratigraphy in your pit.

Test Pit Procedure:

Site Selection:

SAFE, Representative, Polite (lower angle is OK), and Seeking Instability.

- Probe first, ideally away from trees, 120cm wide by 100-120cm deep
- Target the site for the anticipated avalanche problem(s)
- Deep slab avalanche problem – probe for thinner areas to assess
- Be sure your pit has a right-angle corner, smooth walls and vertical cuts

Questions to Ask:

- Where is the weakest layer?
- Does the weak layer fail or break easily?
- Does it propagate?
- Do we have a path of least resistance? What's the structure?

Hand hardness test:

- Particularly of the most significant weak layer, potential bed surface, and potential slab.

Perform CT and ECT: (with saw and/or cord)

- Have the right tools and know where they are in your pack

Snow grain ID:

- Identification of the most significant weak layer and the layers immediately above and immediately below that layer.

Interpreting Results:

- **STRENGTH** – how much force to make the layer fail – This is often spatially variable
- **STRUCTURE** – 5 Lemons – concentrate on weakest layer and slab above. Season History - should be able to correlate significant weather events to major layers within the snowpack.
- **PROPAGATION** – ECTP = big red flag regardless of strength. For mixed messages and softer slabs consider using the PST
- **FRICTION** – Shear Quality/Fracture Character

Avalanches, Whumpfing/Collapsing, Cracking overrule pit info

How do we sort all this information as practitioners?

Most Important ⟷ **Least Important**

Class 1 Data
- Avalanches
- Cracking
- Collapsing
- ECTP

Class 2 Data
- Snow pit results
- Snowpack structure (PHD)
- Thin grey lines in pit wall
- Active loading

Class 3 Data
- Weather reports/forecast
- Avalanche forecast
- Weather history