Spring Conditions Scenario 2:
Daily Melt-Freeze Cycles

Weather
Generally clear spring weather establishes a diurnal cycle that consists of warming from solar radiation and increased air temperatures during daylight hours and cooling overnight as solar radiation stops, air temperatures cool, and heat from the earth radiates out into space. This daily progression is referred to as a melt-freeze cycle.

Snowpack
Melt-freeze cycles create a spring snowpack that consists of increasingly strong crusts on the surface of the snow and dense snow below the crusts. Once the process has progressed through a number of cycles, the combination of strong crusts and dense underlying snow becomes supportive when frozen, wet and slushy when melted, and—that much sought after corn snow in between.

As the name suggests, daily melt-freeze cycles are dynamic, and the snowpack will change dramatically throughout a 24 hour period. In the frozen state, supportive crusts (usually at least 10cm thick or more) "lock" the snowpack in place making avalanches unlikely, but travel is sketchy on the extremely hard, smooth, icy surface.

As things heat up throughout the day, the frozen surface softens and a thin layer of wet, slushy snow on the very top creates a condition referred to as corn snow, a much sought after condition that creates a smooth, silky ride.

At some point, the timing of which varies depending on aspect, elevation, solar radiation intensity, and temperatures the supportive crusts break down and the upper layers of the snowpack become saturated with water. Riding conditions deteriorate and the door is now open for a variety of instabilities to become active in the upper snowpack. The extent to which this deeper and broader destabilization of the snowpack occurs is a function of how thick and supportive the new surface crust is, the temperature and density of the snow below the crust, and how warm and sunny the day becomes.

If melt water percolates deeper into the snowpack, it can activate persistent weaknesses such as older crusts, deeply buried facet and surface hoar layers, or even basal facets or depth hoar from the fall or early winter. Cornices also become weak as soon as they are affected by solar radiation and with daytime warming.

Avalanche Activity
When a thick, melt-freeze surface crust is present, avalanche activity is unlikely. As temperatures rise throughout the day and surfaces become wet or slushy and weak, loose wet avalanches become the primary concern, particularly on steep, solar aspects where the effect of the sun is strongest or in lower elevation terrain where temperatures are usually warmer.

If solar radiation is strong and freezing levels are high, it's possible for melt water to penetrate deeper into the snowpack resulting in wet slab avalanches, often failing on deeper crust layers or other persistent weak layers or possibly even in basal layers at or near the ground. These highly destructive deep persistent avalanches are generally isolated and are most likely to be triggered from shallow areas in the snowpack or as step-down avalanches initiated by surface avalanches or cornice falls.

Large cornice collapses may also occur and are a common trigger for deep persistent releases.

Terrain and Travel Advice

- Be alert to conditions that change with elevation, aspect and time of day. Adjust your travel plans accordingly. On spring trips, early morning travel is often faster and safer so plan your day so you cross exposed slopes before daytime warming makes surfaces wet and weak.
- Aspect is a major player. As a general rule, south-east aspects are the first to destabilize followed by south, then south-west and finally west and even north-west late in the spring. Plan your trips with this scenario in mind.
- Changes can be rapid, sometimes significant change is possible in a matter of minutes, certainly within an hour or two.
- Avoid sun exposed slopes when the solar radiation is strong, especially if snow is moist or wet.
- Cornices become weak with daytime heating, so travel early on exposed slopes.
- It can take several hours for residual heat to escape from the snowpack and even if temperatures have started cooling and the sun has set, it's possible for avalanche danger to remain elevated into the early evening hours. If you get caught out, make sure you wait until the surface begins to freeze before anticipating a decrease in danger.