AVALANCHES & OBSERVATIONS REFERENCE

The American Institute for AIARE Avalanche Research and Education

"The Problem"	Critical / Red Flag Observations	Field Tests & Relevant Observations	Important Considerations
Loose Dry Snow	•Fan-shaped avalanches: debris fine. •Loose surface snow ≥12" (30 cm) deep.	•Boot / ski penetration ≥12" (30 cm). •Slope tests / cuts result in sluffs. •Loose snow surface texture (as opposed to wind-affected, refrozen, or other stiff snow textures).	•Can be triggered by falling snow, cornice fall, rock fall, a brief period of sun, wind, or rider. •Sluffs can run fast and far. •Small slides dangerous with terrain traps / cliffs. •Sluffs can trigger slabs in certain conditions.
Loose Wet Snow	•Rain and / or rapid warming. •Air temp > 0ºC for longer than 24 hours (cloud cover may prevent nighttime cooling). •Pinwheels or roller balls. •Fan shaped avalanches: debris lumpy and chunky.	•Observed and forecast temp trend. •Temps (Air, Surface, T20) / freezing level indicate near surface snow temps at 0ºC. •Note slopes receiving / will receive intense radiation. •Wet snow surface: water visible between the grains with a loupe, may be able to squeeze water out with hands.	•Timing is critical. Danger can increase quickly (minutes to hours). •No freeze for multiple nights worsens condition. However, nighttime freeze can stabilize. •Gullies and cirques receive more radiation and retain more heat than open slopes. •Shallow snow areas become unstable first - may slide to ground in terrain with shallower, less dense snowpack.
Wet Slab	•Rain on snow, especially dry snow. •Current or recent wet slab avalanches: debris has channels / ridges, high water content, may entrain rocks and vegetation. •Prolonged warming trend, especially the first melt on dry snow.	•Consider Loose Wet Snow observations. •Observed melting snow surface (rain or strong radiation) of a slab over weak layer. •Tests show change in strength of weak layer due to water and / or water lubrication above crust or ground layer. •Identify the depth at which the snow is 0ºC. •Monitor liquid water content and deteriorating snow strength using hardness and penetration tests. •Nearby glide cracks may be widening during rapid warming.	•May initiate from rocks or vegetation. •Can occur on all aspects on cloudy days / nights. •Conditions may also include cornice fall, rockfall or increased icefall hazards. •Snow temp of slab at or near 0ºC. •Loose wet snow slides can occur just prior to wet slab activity. •Possible lag between melt event and wet slab activity.
Storm Slab	•Natural avalanches in steep terrain with little or no wind. •≥12" (30cm) snowfall in last 24 hours or less with warmer heavier snow. •Poor bond to old snow: slab cracks or avalanches under a rider's weight.	•Observe storm snow depth, accumulation rate and water equivalent. •Observe settlement trend: settlement cones, boot / ski pen, measured change in storm snow (>25% in 24 hours is rapid). •Tests show poor bond w/ underlying layer (Tilt and ski tests). ID weak layer character. •Denser storm snow over less dense snow (boot / ski penetration, hand hardness).	•Rapid settlement may strengthen the snowpack, or form a slab over weak snow. •When storm slabs exist in sheltered areas, wind slabs may be also present in exposed terrain. •May strengthen and stabilize in hours or days depending on weak layer character. •Potential for slab fracturing across terrain can be underestimated.
Wind Slab	•Recent slab avalanches below ridge top and / or on cross-loaded features. •Blowing snow at ridgetop combined with significant snow available for transport. •Blowing snow combined with snowfall: deposition zones may accumulate 3-5x more than sheltered areas.	•Evidence of wind-transported snow (drifts, plumes, cornice growth, variable snow surface penetration with cracking). •Evidence of recent wind (dense surface snow or crust, snow blown off trees). •≥ Moderate wind speeds observed for significant duration (reports, weather stations and field observations).	•Often hard to determine where the slab lies and how unstable and dangerous the situation remains. •Slope-specific observations, including watching wind slabs form, are often the best tool. •Strong winds may result in deposition lower on slopes. •Commonly trigged from thin areas (edges) of slab. •Wind transport and subsequent avalanching can occur days after the last snowfall.
Persistent Slab	•Bulletins / experts warn of persistent weak layer (surface hoar, facet/crust, depth hoar). •Cracking, whumping.	•Profiles reveal a slab over a persistent weak layer. •Use multiple tests that will verify the location of this condition in terrain. •Small column tests (CT, DT) indicate sudden (Q1) results; large column tests (ECT, PST, RB) show tendency for propagating cracks.	•Instability may be localized to specific slopes (often more common on cooler N / NE aspect) and hard to forecast. •Despite no natural occurrences, slopes may trigger with small loads - more likely when the weak layer is 8-36" deep (20-85cm). •Human triggered avalanches are still possible long after the slab was formed.
Deep Slab	•Remotely triggered slabs. •Recent and possibly large isolated avalanches observed with deep, clean crown face.	•Profiles indicate a well preserved but deep (≥1m), persistent weak layer. •Column tests may not indicate propagating cracks; DT and PST can provide more consistent results. •Heavy loads (cornice drop or explosives test) may be needed to release the slope - large and destructive avalanches result.	•May be aspect / elevation specific - very important to track weak layer over terrain. •Slight changes, including mod. snowfall, and warming can re-activate deeper layers. •May be dangerous after nearby activity has ceased. •Tests with no results are not conclusive. •May be remotely triggered from shallower, weaker areas. •Difficult to forecast and to manage terrain choices.
Cornices	•Recent cornice growth. •Recent cornice fall. •Warming (solar, rain at ridge tops).	•Note rate, extent, location and pattern of cornice growth and erosion. •Photos tracking change over time.	•Cornices often break further back onto ridge top than expected. •Can underestimate sun's effect on the back of cornice when traveling on cool, shaded aspects.