Snow Travel, Avalanche Awareness, and Crevasse Rescue

Basic Alpine Climbing Course

Lecture #3

April 2, 2026

Peter Erickson

Photo: Approach to Little Tahoma from Paradise, Mount Rainier National Park, May 7, 2018

Why do you [want to] climb snow?

Photo: Eldorado Peak, April 23, 2018

Outline – (it’s all about traveling safely)

- **Traveling on snow** – terrain, hazards, techniques, equipment
- **Snow anchors, belays –** when risk increases
- **Crevasse rescue –** made simple (ha)
- **Avalanches** – managing risk
- **Snow camping**

Traveling on snow

Samples of terrain and snow conditions you will encounter on basic climbs

Photo: Sahale Peak, July 19, 2016
(Photo by Michael Toyama)

Photo: Quien Sabe Glacier, June 30, 2013
(Sahale Peak is behind us; Sharkfin Tower is off-screen in upper right)

Photo: Whitehorse Mountain, May 20, 2014

Photo: South Early Winter Spire: May 30, 2016

Photo: Mount Rainier, June 21, 2015

Photo: Mount Rainier, Emmons Glacier, June 21, 2014

Photo: Sloan Peak, July 24, 2016


Photo: Returning from Black Peak, May 24, 2020
(Cutthroat Peak and Whistler Mountain shown)

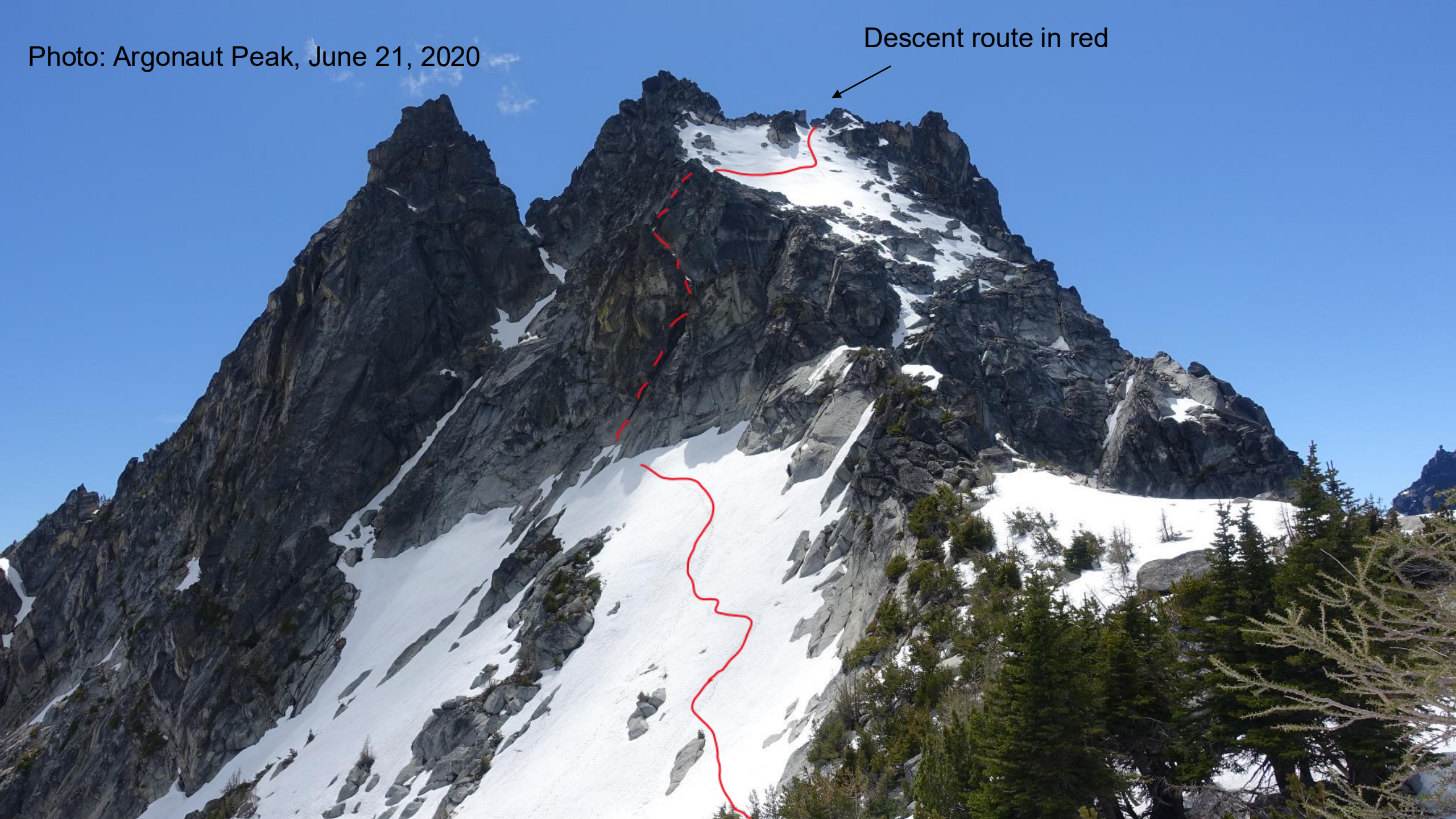


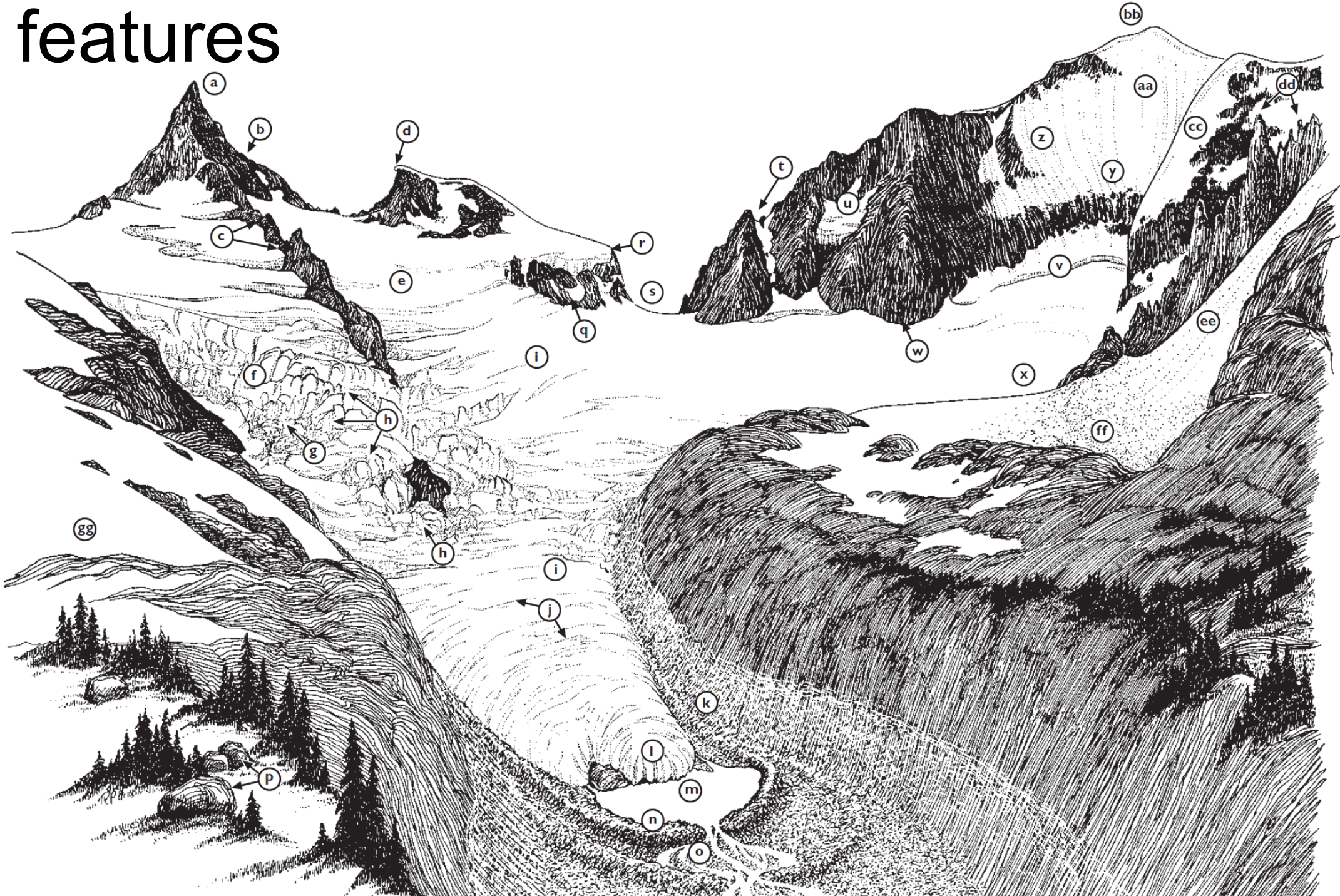
Photo: Argonaut Peak, June 21, 2020
Descent route in red

What kind of hazards did you notice?

- Dangerous **runout** / exposure
- Crevasses
- Snow conditions – poor traction / sharp ice / crampon balling
- Snowbridges, Tree-wells
- Sun / UV (glacier glasses / sunscreen mandatory)
- Weather / visibility
- What else?

Terrain features

a. Horn or aiguille
b. Ridge
c. Rock arête
d. Cornice
e. Glacier basin
f. Seracs
g. Fallen seracs
h. Icefall
i. Glacier
j. Crevasses
k. Lateral moraine
l. Snout
m. Moraine lake
n. Terminal moraine
o. Glacial runoff
p. Erratic blocks
q. Rock band
r. Shoulder
s. Col
t. Couloir or gully
u. Hanging glacier
v. Bergschrund
w. Buttress
x. Cirque or bowl
y. Headwall
z. Flutings
aa. Ice wall
bb. Summit
cc. Ice arête
dd. Towers or gendarmes
ee. Avalanche chute
ff. Avalanche debris
gg. Snowfield



Snow travel – techniques and equipment

- Assessing runout and consequence
- How not to fall
  - Walking in balance
  - Wear crampons
  - Self “belay”
- How to move efficiently (not just for snow)
  - Flotation (snowshoes…)
  - Rest step
  - Plunge step
  - Clothing systems (& packing systems)
  - Food and drink systems

How not to fall: Walking in balance

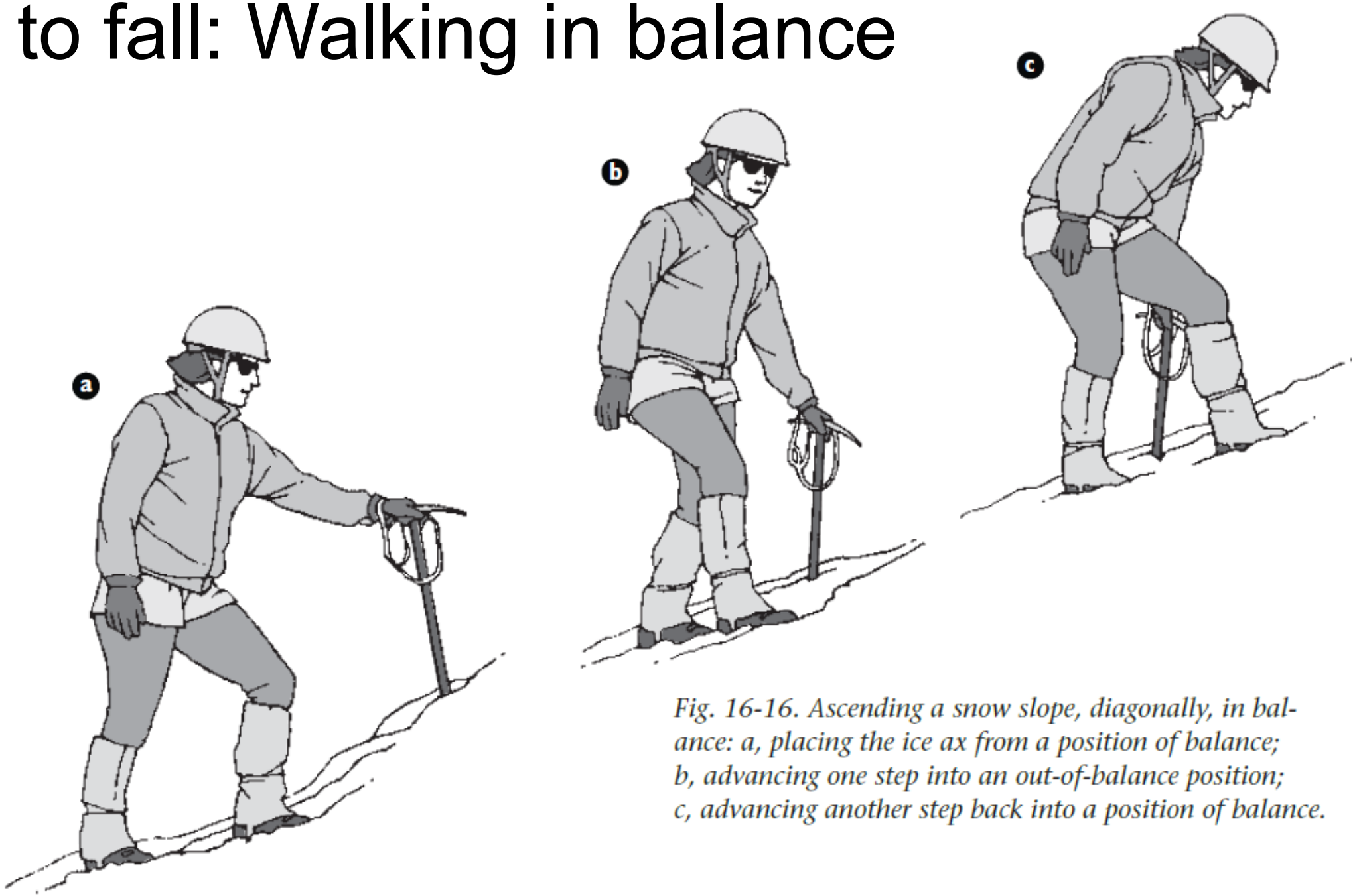
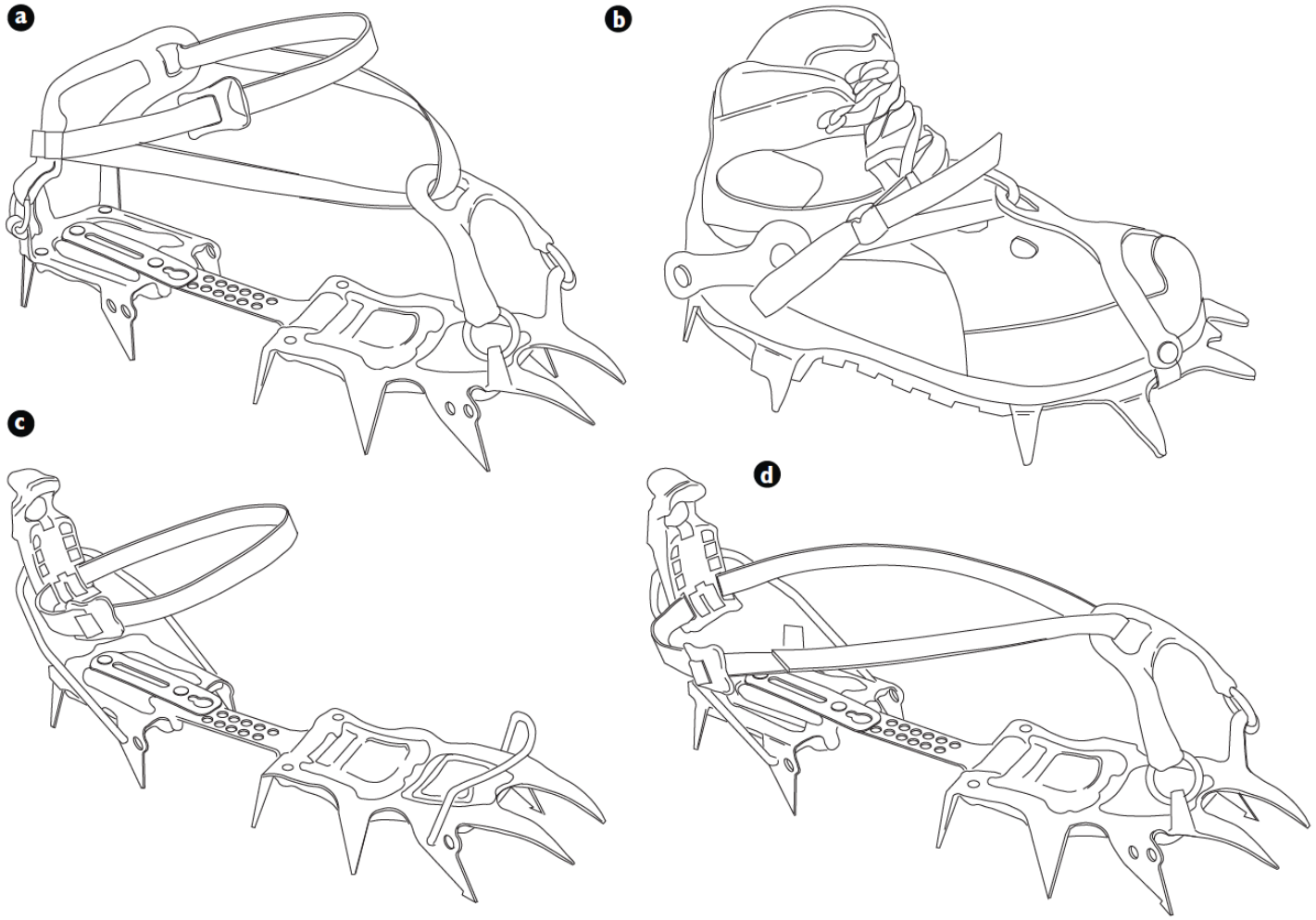


Fig. 16-16. Ascending a snow slope, diagonally, in balance: a, placing the ice ax from a position of balance; b, advancing one step into an out-of-balance position; c, advancing another step back into a position of balance.

Photo: Silver Peak, Jan 3, 2015

How not to fall: wear crampons!



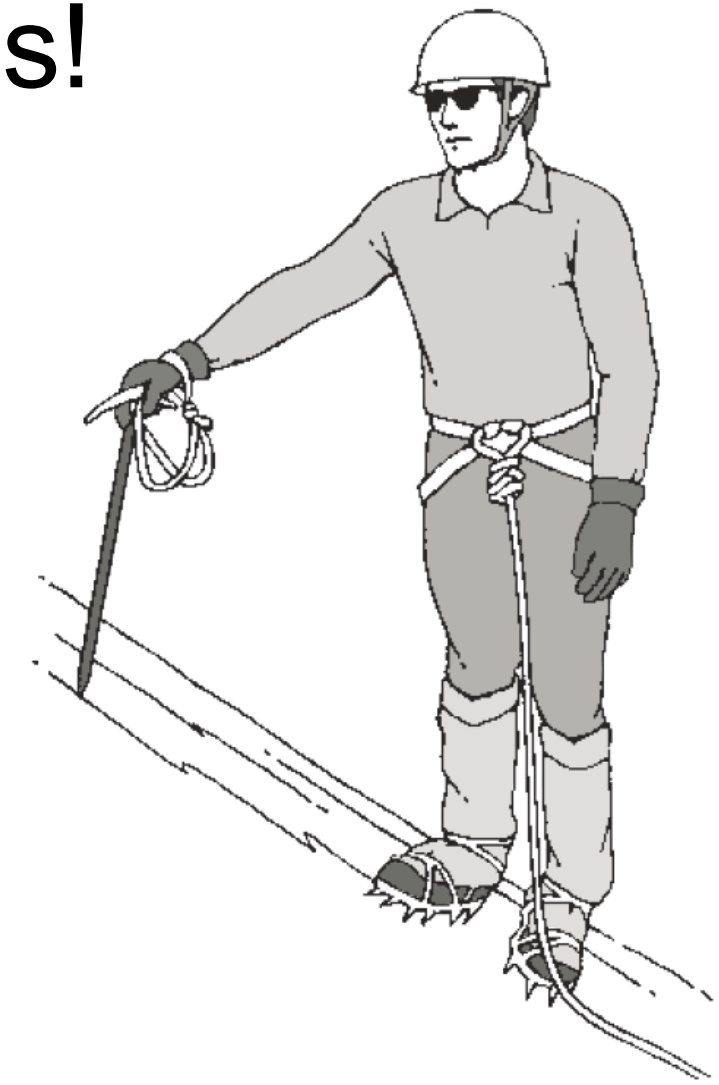
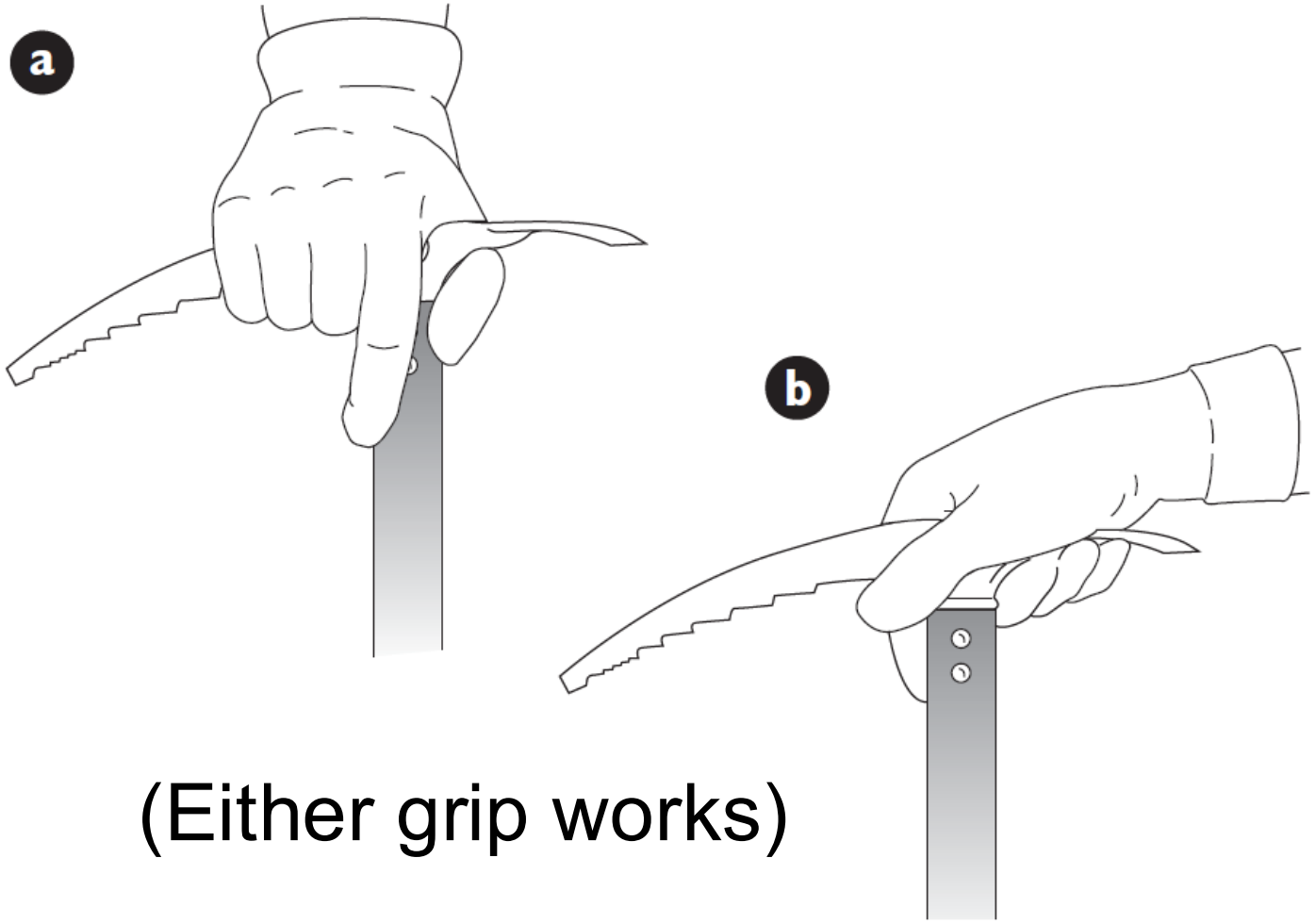


Fig. 18-13. French technique on a moderate slope, flat-footing in a diagonal ascent combined with ice ax in cane position.

How not to fall: Self-belay



(Either grip works)

Fig. 16-15. Grasping an ice ax: a, self-arrest grip; b, self-belay grip.

Fig. 16-23. Facing in (backing down): place ax low on the slope and don't lean in toward the slope.

Other ice axe considerations

- When to use it? (e.g., likelihood and consequence of fall)
- Leashed or un-leashed
- Length
- Shaft / pick shape and details (more advanced topic)
- Always wear gloves

Other crampon considerations

- Too sharp (out of box) can be a hazard
- Gaiters help limit snagging too (if snugly fitted)…
- **Fit them to boots <u>ahead of time</u>** (double check!)
- Requires careful / attentive walking
- Aluminum v. steel (steel more versatile, preferred for first pair)
- Avoiding a fall with crampons is <u>way better</u> than counting on stopping a fall with self-arrest

How to move efficiently:

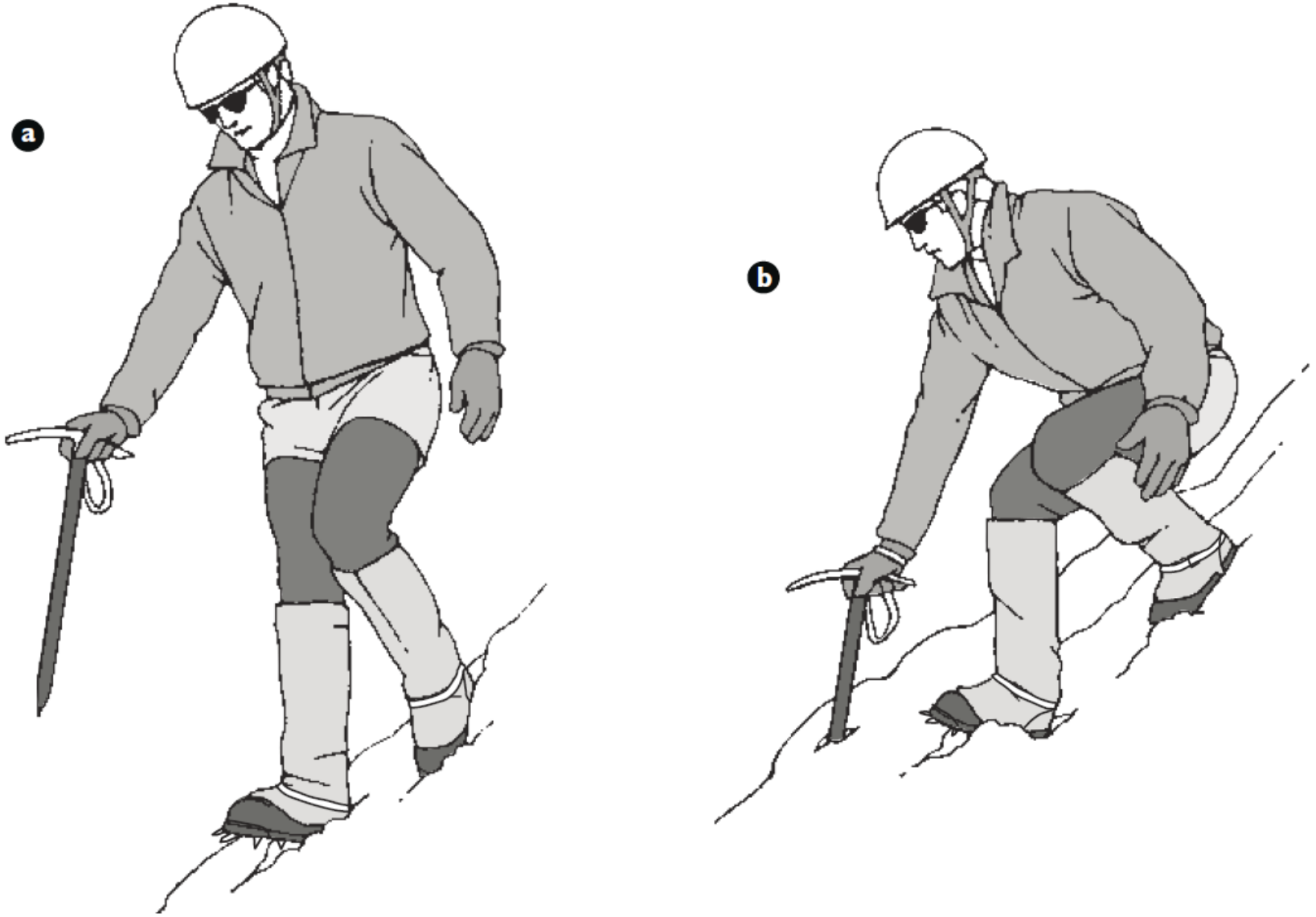
- Soft snow (esp. Winter / early Spring): **Flotation** (snowshoes…, or skis)
- Hard snow (Late spring through autumn:) **Crampons**

Photo: Mazama Ridge, snow overnight, March 2015

How to move efficiently (kicking steps)

- Lead step-kicker should consider fitness and height of team
- How high each step?
- Straight up or traversing?
- Take turns in lead to spread step-kicking effort
- Reinforce steps as you go (2^{nd}, 3^{rd} person, etc.)
- Pacing important to maintain efficient cardio

How to move efficiently (going down): plunge step (“nose over toes”)



How to move efficiently (going down): can you glissade safely?

Fig. 16-24. Glissades: a, sitting; b, standing;

How to move efficiently: other considerations

- Clothing and packing systems
  - Layers that can be added and subtracted
  - Start out cold (seriously – sweat is your enemy)
- Food and hydration
  - Keep eating; keep quick calories in your pocket
  - Keep drinking; hydration tube very helpful
- Clear, open communication (creates shared expectations)
  - Planned rest breaks (e.g. 5 minutes every hour) can help

Last resort: self-arrest (may not work)

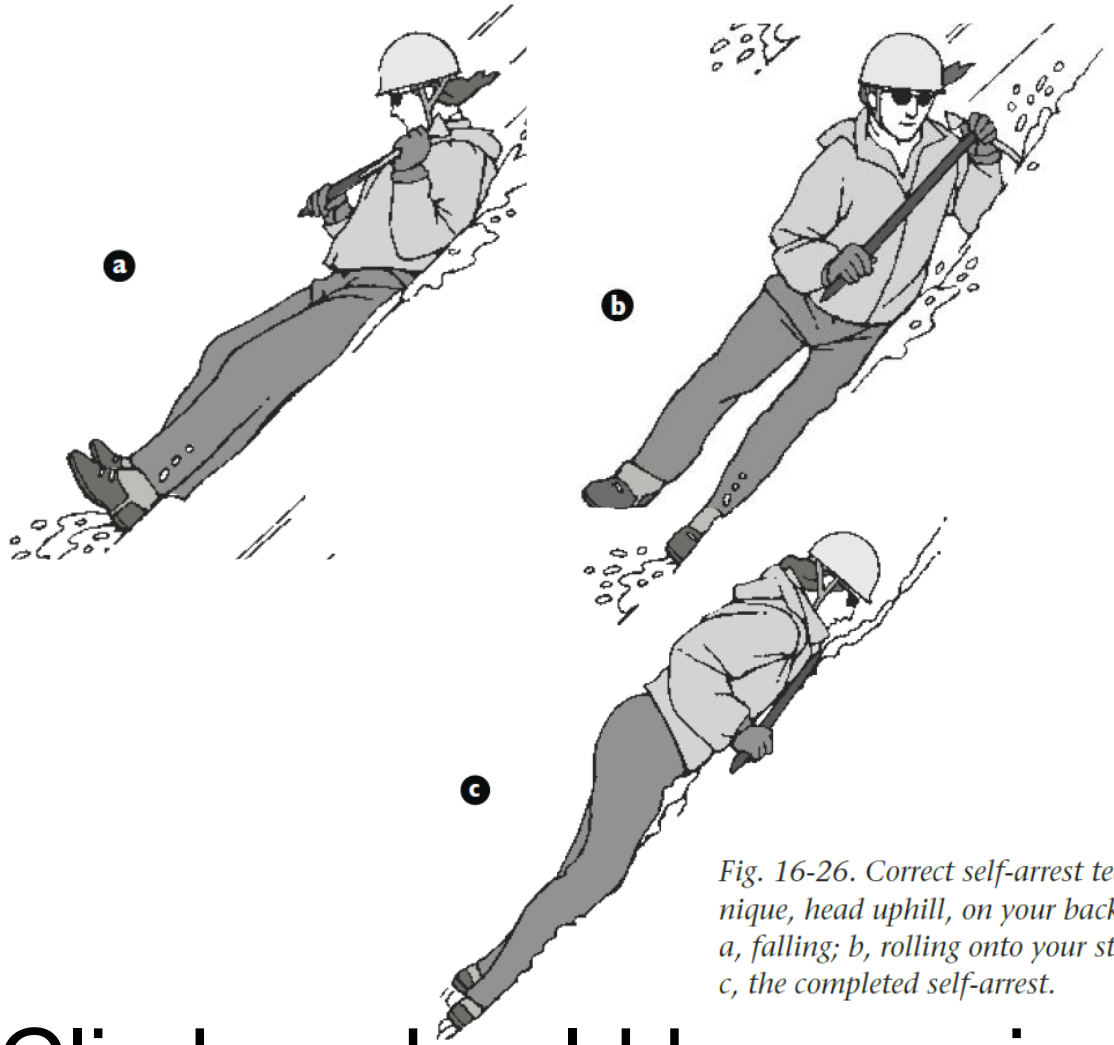
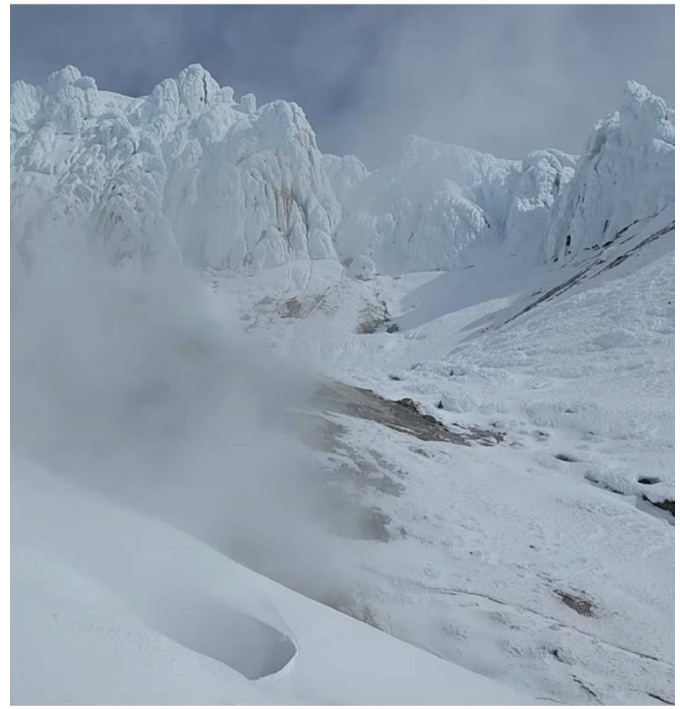


Fig. 16-26. Correct self-arrest technique, head uphill, on your back: a, falling; b, rolling onto your stomach; c, the completed self-arrest.



Posts
mthoodclimbingrangers

414 3 30

mthoodclimbingrangers 3/30/26: Very firm conditions persist on the south side. We did find good purchase with crampons today, and patches of new snow intersperse the icy surfaces with rime "chickenhead" texture. The risk of long, sliding falls on hard snow remains a key concern for anyone on the upper mountain. It's a time to bring gear and skills to stay on your feet, not count on self-arrest stopping a slide, and carefully assess terrain ahead of you, knowing the mountain will wait if you don't like the conditions you find.

Also remember that the powerful spring sun can cause icefall on cooler days— Don't linger downslope of ice accumulations, especially if you're optimistically waiting for the hard snow to soften in the sun.

#icy #hardsnow #mthood #mthoodconditions #slideforlife

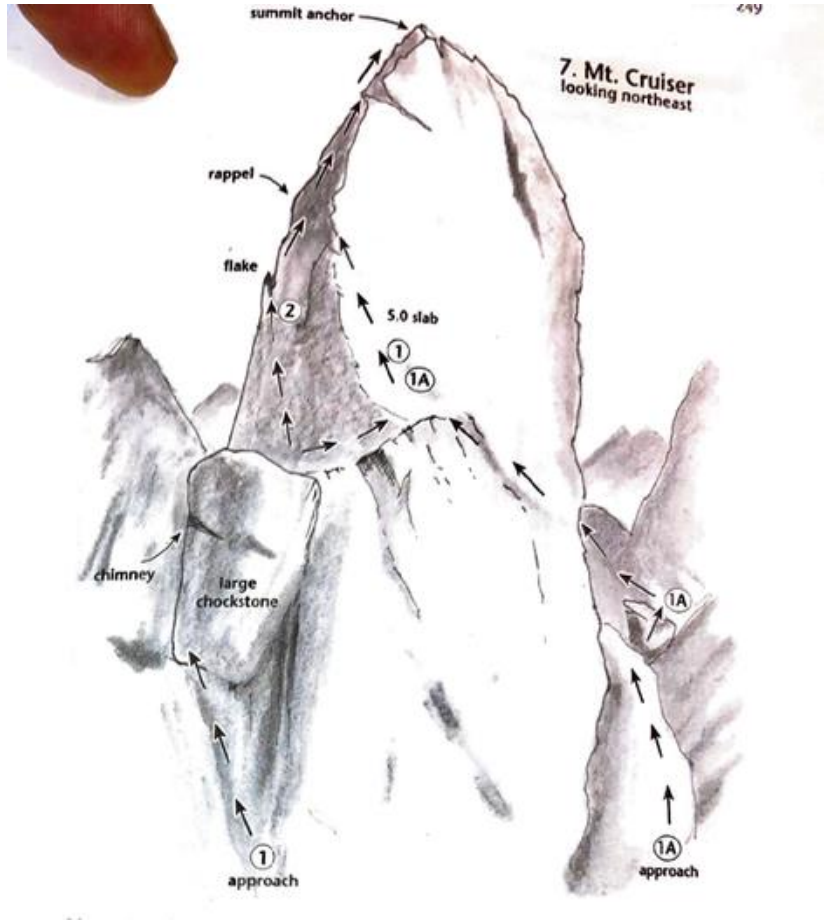
Climber should be wearing crampons!

How to move safely (here, quickly!!!)

Photo: Mount Rainier, Disappointment Cleaver, June 21, 2015

Discussion – what gear to bring?

- Mt. Cruiser in Olympic National Park
  - In mid-July, over two or three days, depending on how long it takes
  - Long approach: 7.5 miles one way from the trailhead to Flapjack lakes
  - Forecast: daytime highs in the 80s, night-time lows in the 50s; partly cloudy overnight, clearing by morning
  - Handout has route description and map
- **Discuss pros and cons of bringing crampons and ice axe**
  - And, if bringing them, will you also put on harnesses / use the rope? (Which you are already planning on bringing because Cruiser is a rock climb)



Approach. From Flapjack Lakes, take the 1.4-mile trail toward Gladys Divide (see Approach 1a in Part I, Climbing Routes). Just before reaching the divide, turn right and ascend the 700-ft chute to a notch in the ridge crest (Needle Pass). This steep chute is usually icy. Traverse E on the left side of the pass for 50 ft, then turn to the N and ascend to the ridge crest.

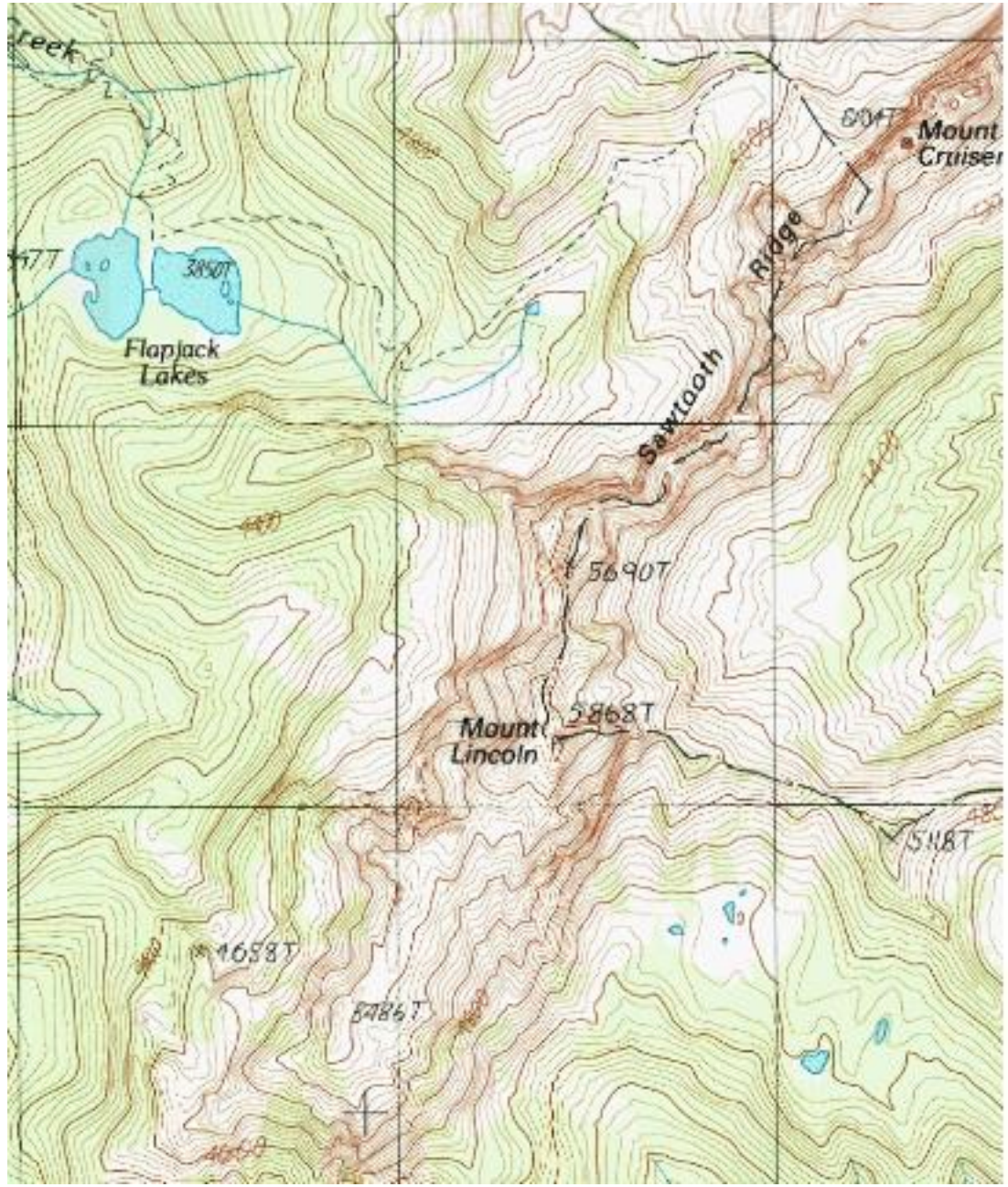


Photo: Mt. Cruiser, July 12, 2014

Snow anchors and belays

When the risk of a fall increases in likelihood or consequence

Running belay

Pickets like this work in hard snow (“neve”) only

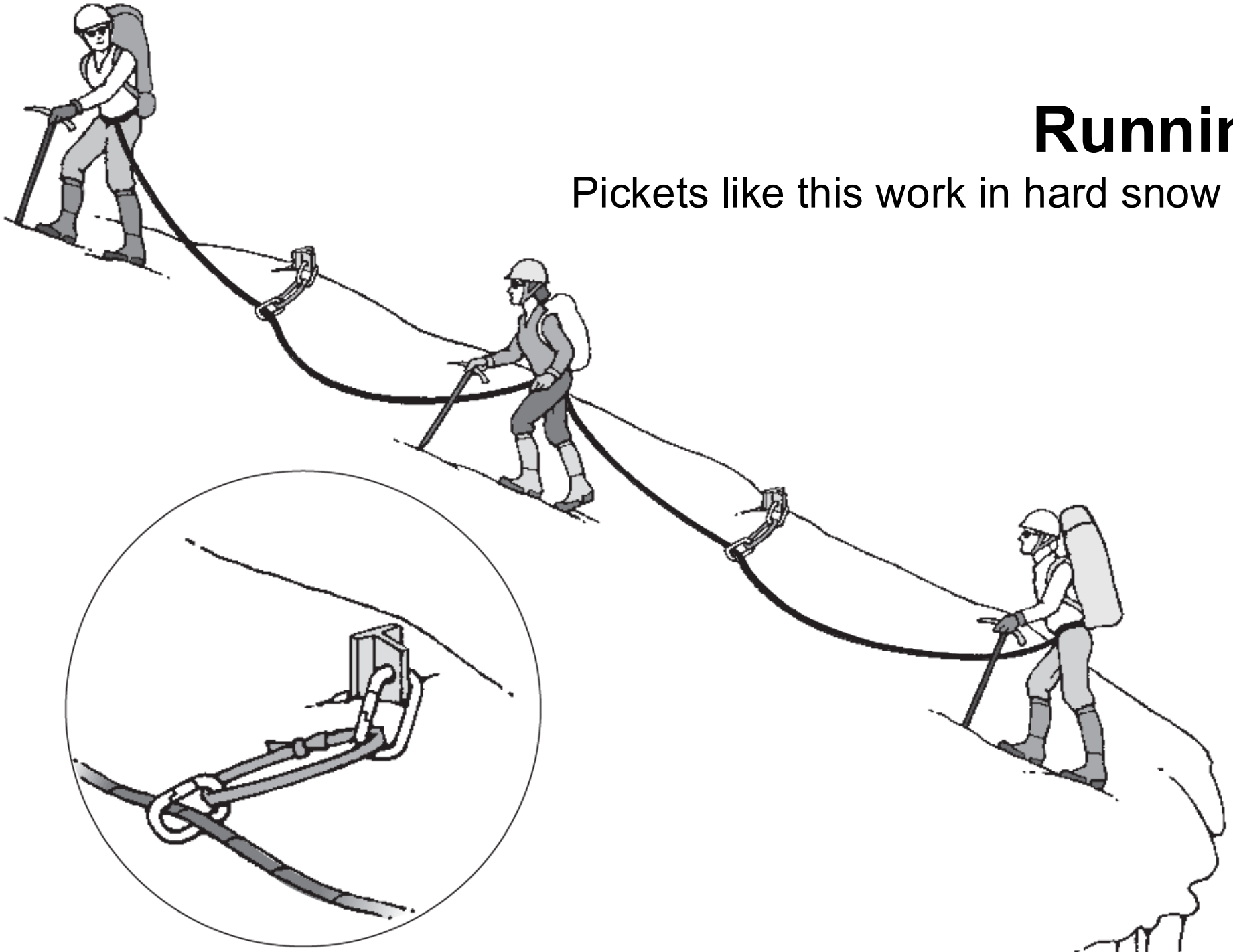


Photo: Mount Rainier, Disappointment Cleaver, June 21, 2015

Belaying & rappelling in snow

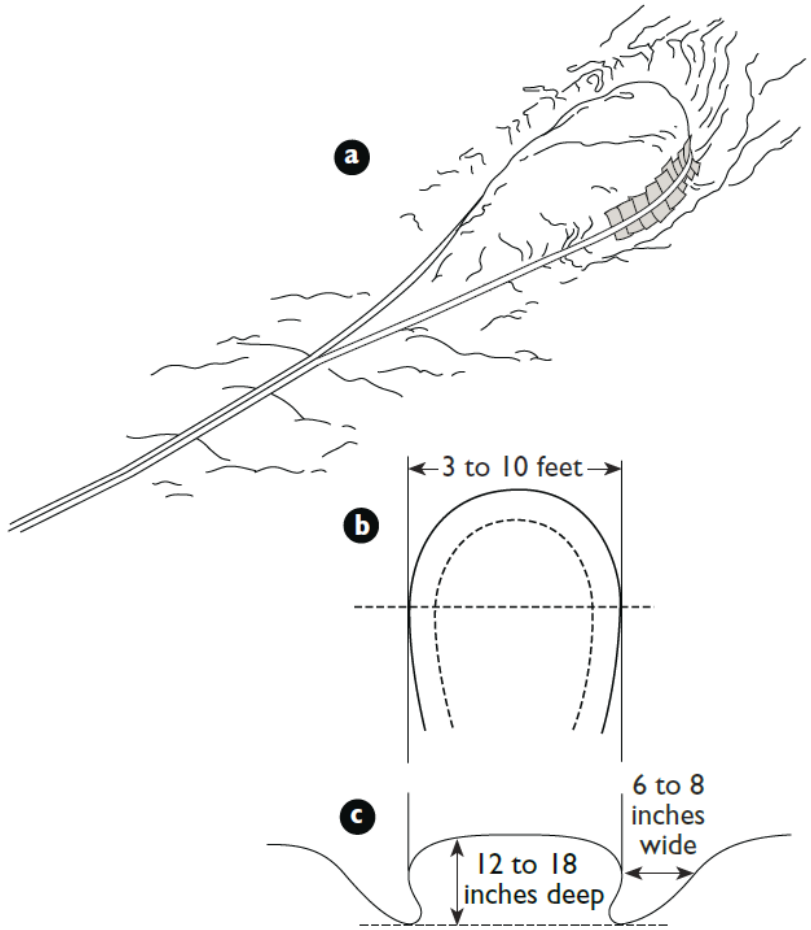


Fig. 16-35. Snow bollard: a, in a rappel setup; b, viewed from above; c, cross section.

Fig. 16-39. Sitting hip belay.

Photo:
Mount Rainier, Emmons Glacier, June 21, 2014

Consider a belay?

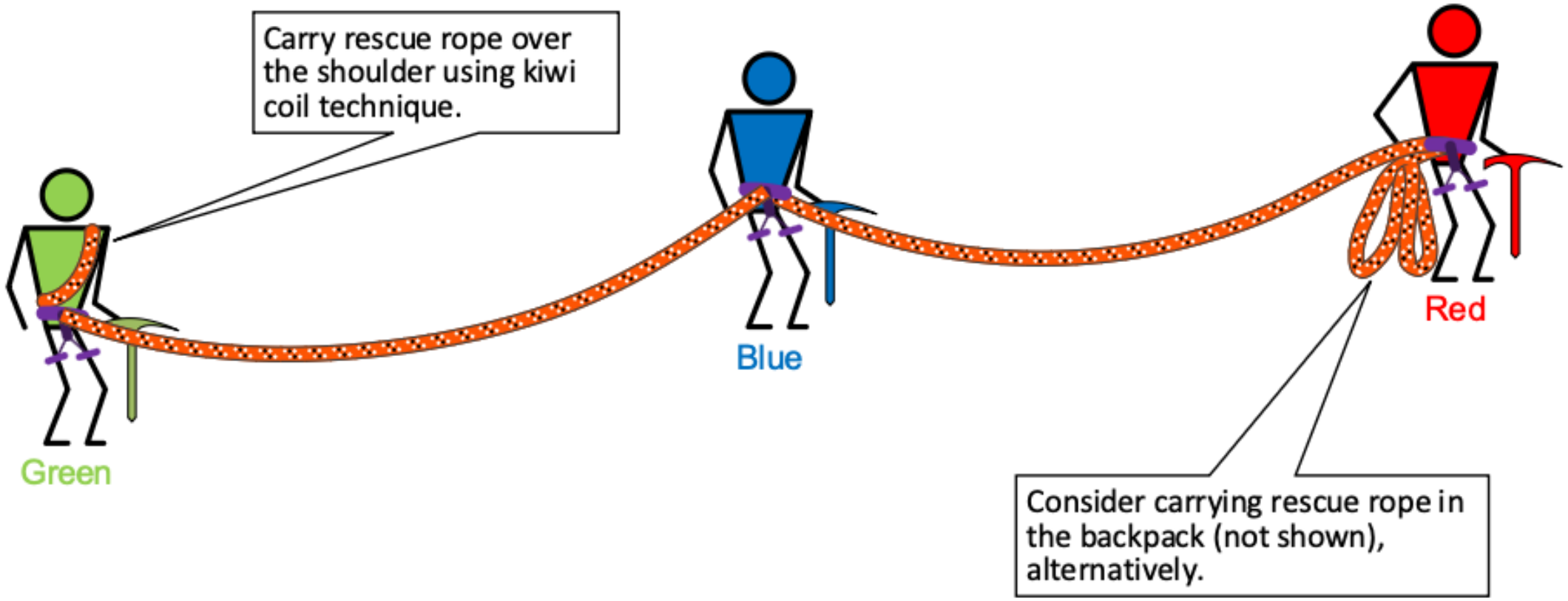
Photo: Eldorado Peak, June 25, 2015

Should you rope up on steep snow if you aren't placing pickets or other protection?

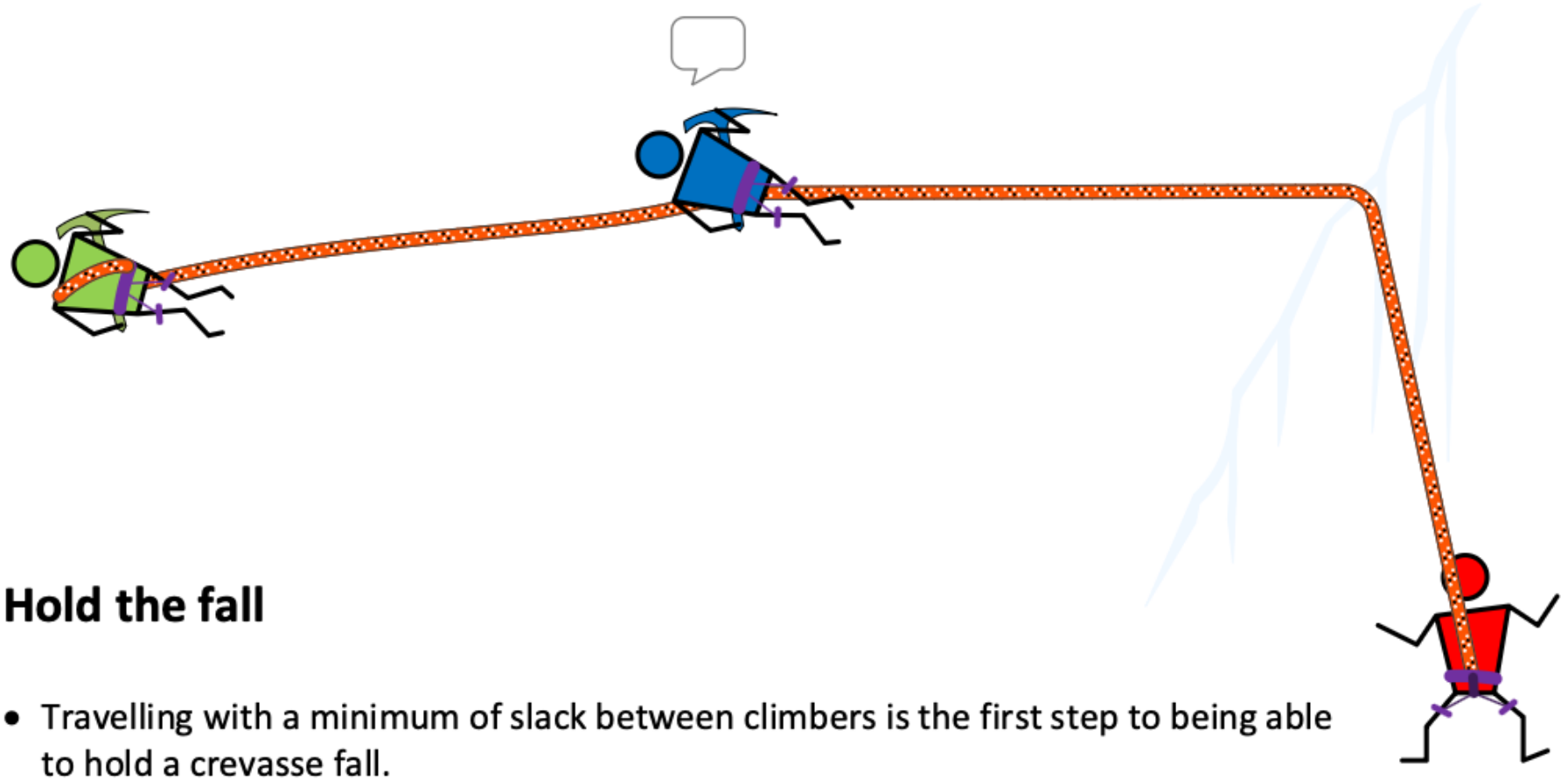
Photo: Mount Shuksan (approaching summit pyramid), June 5, 2016
(photo by Stephen Sugiyama)

Intro to Crevasse Rescue

Rope up for glacier travel in groups of 3



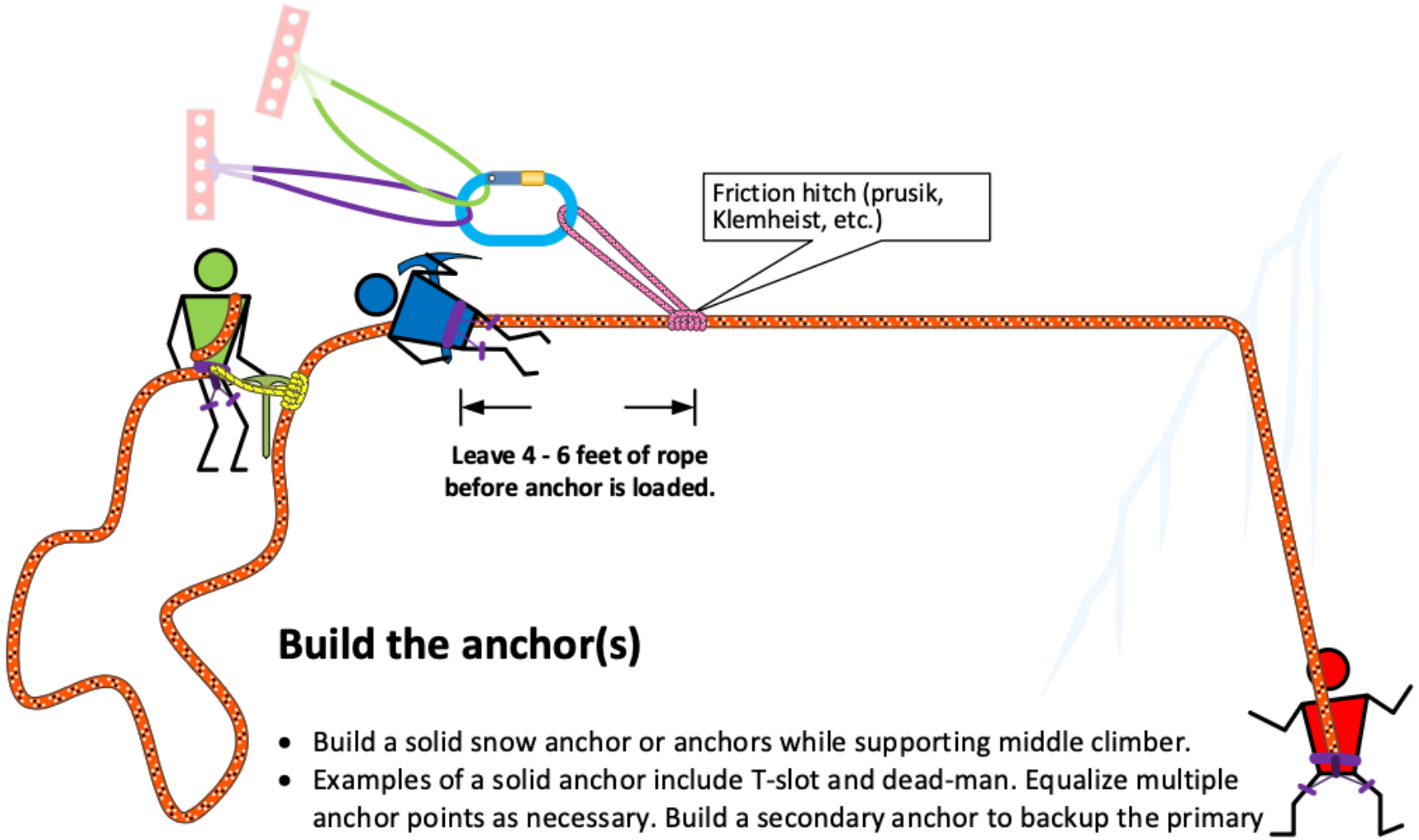
FALLING! Self-arrest and hold!



Hold the fall

- Travelling with a minimum of slack between climbers is the first step to being able to hold a crevasse fall.

Build the anchor(s)

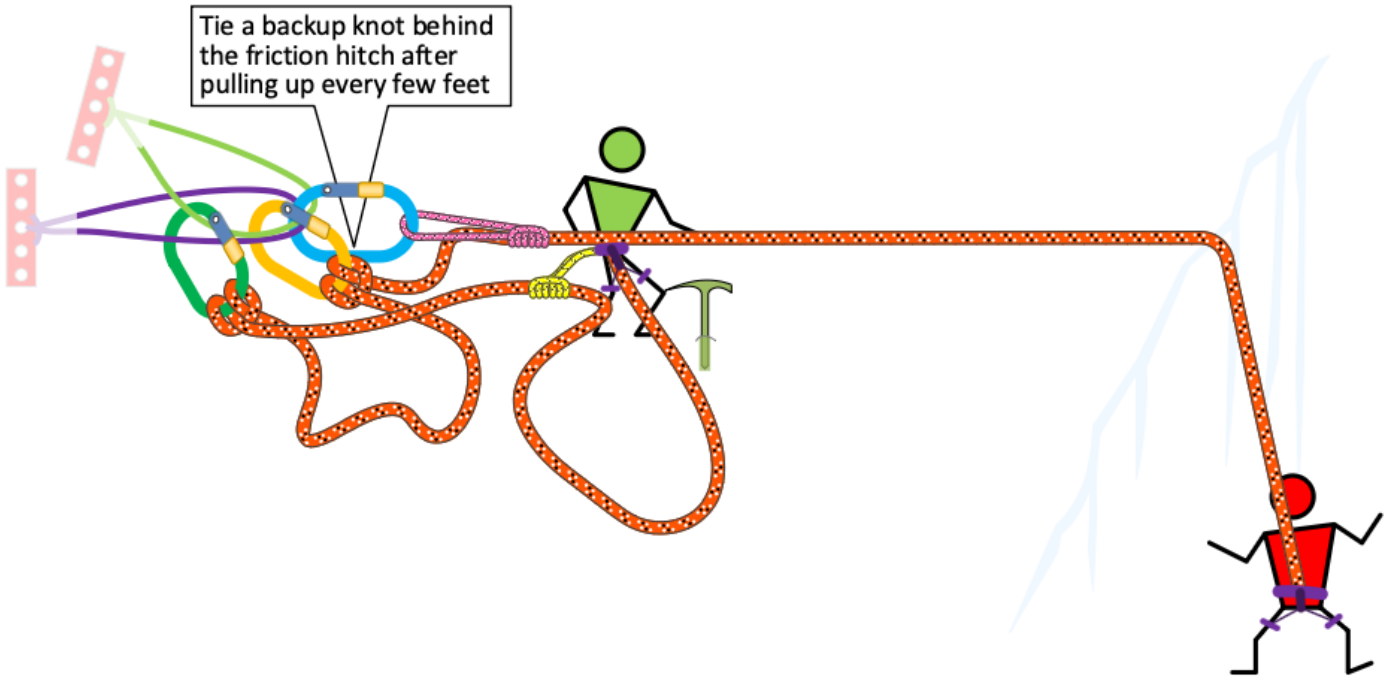


Build the anchor(s)

- Build a solid snow anchor or anchors while supporting middle climber.
- Examples of a solid anchor include T-slot and dead-man. Equalize multiple anchor points as necessary. Build a secondary anchor to backup the primary anchor. Make sure each anchor does not impact the security of other anchor(s) if it were to fail.

Communicate, assist climber, & execute

1. **Direct pull** (got lots of people? Then pull!), and/or
2. **Have climber ascend the rope** (Texas prusiks…), and/or
3. **Drop-loop C-Pulley** (uses mechanical advantage)



Managing risk from Avalanches

Confirmation bias can be deadly

- “Well, they crossed it safely just an hour ago”
- “So-and-so has been here before”
- “I haven’t heard of any recent avalanches”
- “I don’t see any avalanches”
- How relevant are these observations?

You can’t learn all about avalanche safety in one evening

- But you can learn:
  - Terrain selection, e.g. avalanche angles.
  - Critical communication practice:
    - Agree to travel as a team, speak up
    - Challenge assumptions
    - Respect anyone’s veto
  - Resources:
    - Northwest Avalanche Center (NWAC)
    - AIARE..(classes)
    - Mapping tools that shade slope angles
  - Some things to avoid

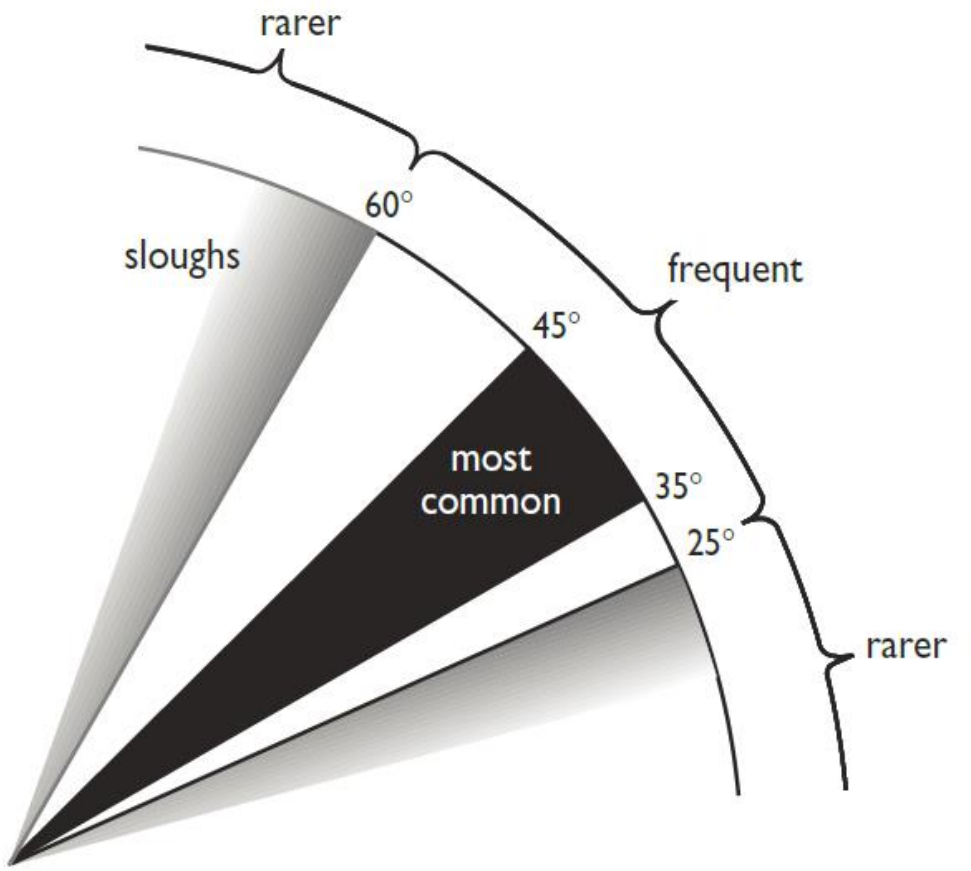
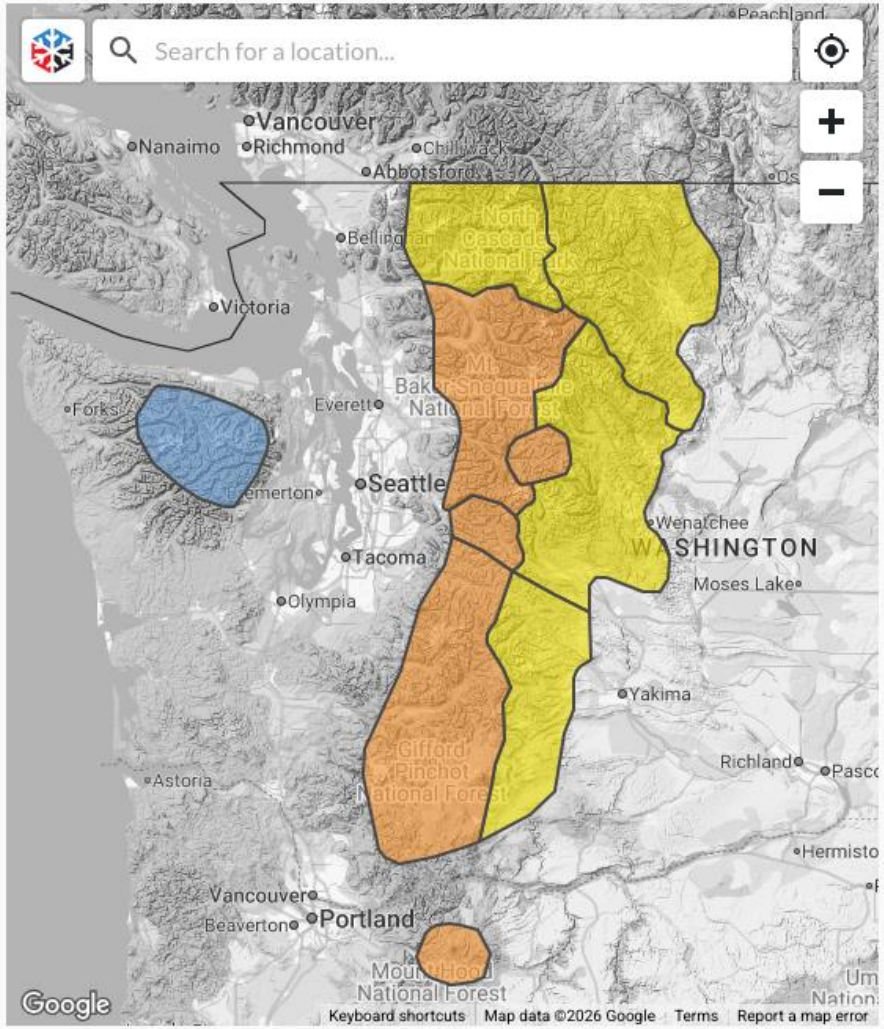


Fig. 16-42. Frequency of avalanches on slopes of various angles.

Today’s Avalanche Forecast (NWAC)

Avalanche Forecast By Zone



Get Involved

Become a Member

Become a Volunteer

News

NWAC is seeking new board members. Learn more about the positions and how to apply here.

Spring forecast schedule through Sunday, April 19th

- Avalanche Forecasts are issued daily @ 630pm
- Mountain Weather Forecasts are issued at 7am & 230pm daily
- Starting Monday, April 20th, Mountain Weather Forecasts are issued daily @ 230pm through Sunday May 3rd

NWAC Community

- Support your local community by submitting an observation.
- We built an app! You can download here: Apple or Android
- Community Resources for Grief Support: American Avalanche Association (A3): Resilience Project, American Alpine Club: Climbing Grief Fund, Survivors of Outdoor Adventures and Recovery (SOAR)

Recent Blogs

A Facet-nating Journey
NWAC Fall ’25 Events Recap
NWAC + the Future of Forecasting in the US

Understand the potential problems

BACKCOUNTRY AVALANCHE FORECAST

Print

SNOQUALMIE PASS

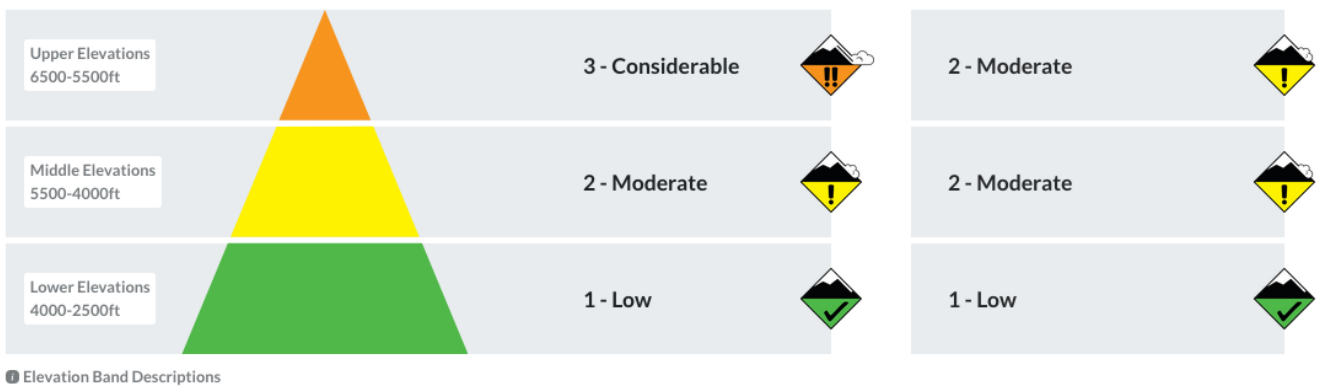
ISSUED	EXPIRES	AUTHOR
Wednesday, April 1, 2026 - 6:30PM	Thursday, April 2, 2026 - 6:30PM	Andy Harrington

THE BOTTOM LINE

Stormy weather will increase avalanche potential on Thursday. You're more likely to trigger an avalanche in wind-loaded terrain or on convex features. Use small test slopes or quick hand pits to gauge how much new snow there is and where potential failure points exist.

Avalanche Forecast | Observations | Avalanches | Weather Forecast

AVALANCHE DANGER



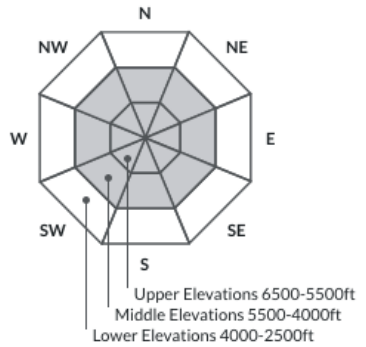
AVALANCHE PROBLEMS (1)

PROBLEM #1: WIND SLAB

PROBLEM TYPE

Wind Slab

ASPECT/ELEVATION

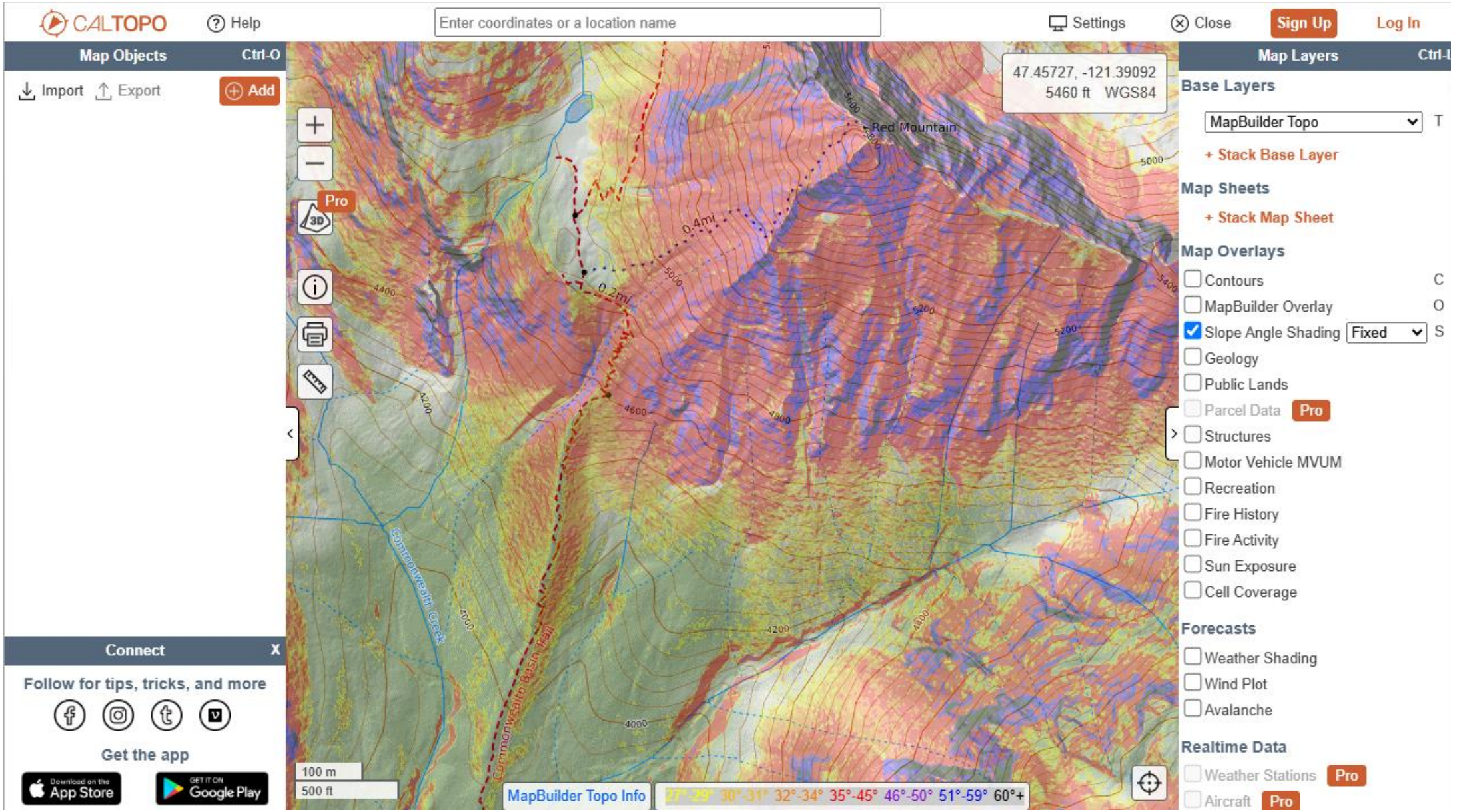


LIKELIHOOD

While you may find upside-down snow or sensitive pockets in sheltered terrain, the largest and most consequential slides are expected to be on wind-loaded slopes. Look for visual clues such as actively blowing snow, textured surfaces, or new drifts to help identify leeward aspects. Then you can steer around convexities, rocky outcrops, or steep open slopes below ridgelines where wind slabs are more likely to form.

Using uptrack tests, small test slopes, or quick hand pits can help you identify the depth and reactivity of the new storm snow. Look for heavy snow over weaker snow or slab failures as an indication to dial back your terrain choices to simpler, lower-angled slopes.

Evaluate terrain risks, using maps



Things to avoid:

Cornices…

Photo: Blue Lake Bowl / Peak: May 30, 2016

Things to avoid: pinwheels / roller balls

Other avalanche considerations

- Slope / solar aspect matters a lot
- Avoid terrain “traps” / cliffs below possible avalanches
- Beware “whoompfing”, shooting cracks
- Beware rapidly warming temps, especially in spring
- Favor ridgelines in your travel (not bowls)
- If anybody isn’t “feeling it”, trust your instincts, come back another time
- *Most Mountaineers basic climbs are scheduled after avalanche risk has subsided (generally after mid-April)*

Snow camping

Different than summer camping

Snow camping –different than summer camping

- Obvious
  - Cold
  - Heavier / more gear
- Less Obvious
  - Snow is nice to camp on
  - Tents more difficult to set up
  - Site selection may be more critical
  - Wind may blow your tent away

Photo: Mount Baker, May, 2012

Photo: Snow kitchen,
Mazama Ridge, snow overnight, March 2015

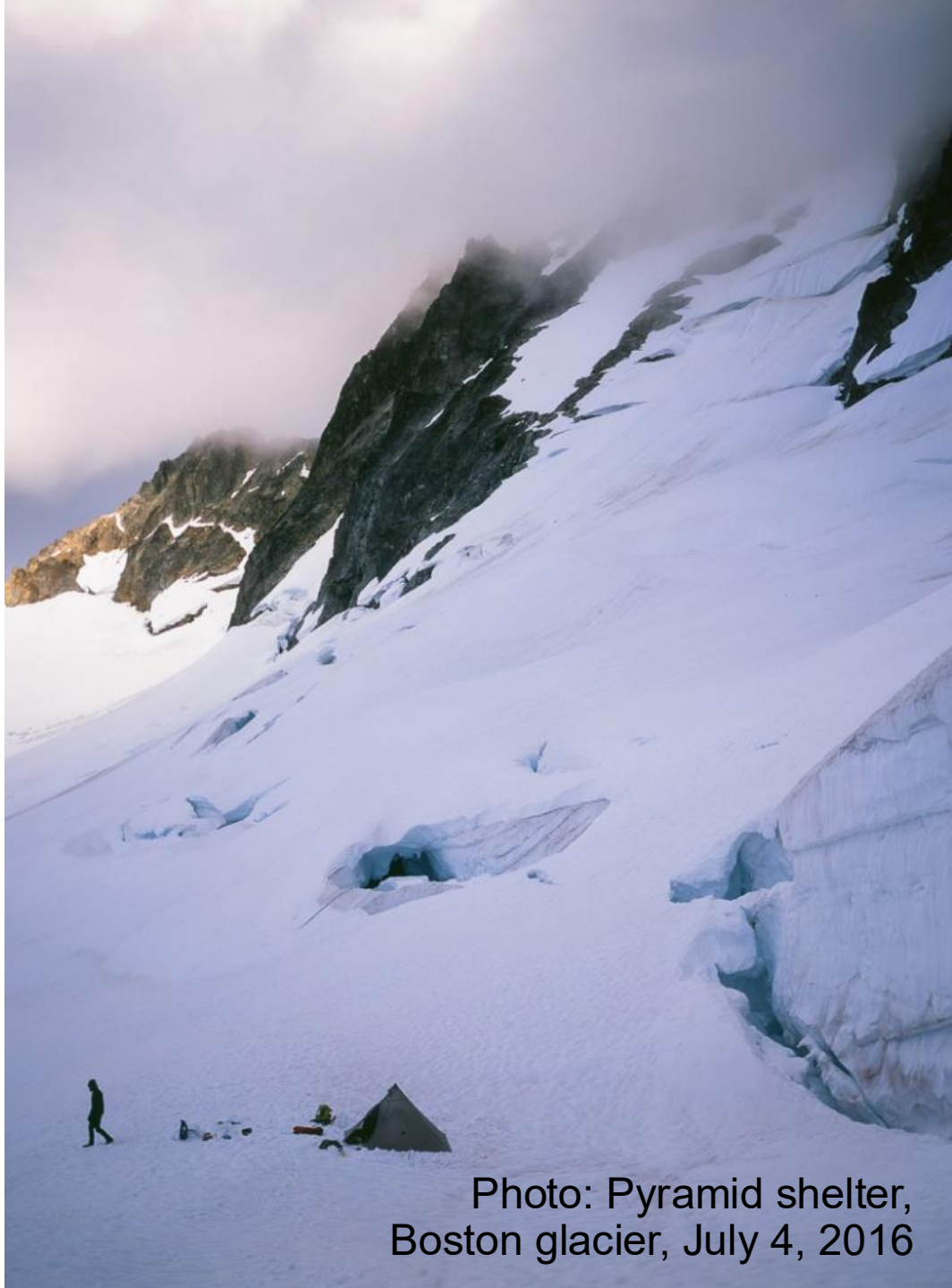


Photo: Pyramid shelter,
Boston glacier, July 4, 2016


Photo: 4-Season tent
Headlight Basin, below Ingalls Peak, May 15, 2020
Ingalls Peak, South Ridge (5.4)

Snow and winter camping site selection

- Seek
  - Wind protection
  - Snow deep enough to dig out “built-in” features?
  - Flat platform (or can make flat)
  - Secure anchoring
- Avoid
  - Avalanche terrain or runout
  - Low spots (slush?)

Photo: Decker Glacier, Spearhead Traverse BC
April 2017

Other winter camping considerations

- Sleeping bag: ~15 degree usually suffices for three-season bag for Cascades
- Sleeping pad: need R-value 5 for snow
  - Often means two pads, e.g. closed cell foam + inflatable
  - Or… inflatable R-value 5+ pad (expensive, e.g. Therm-a-Rest X-therm)
- Clothing system
  - Base layer, windbreaker, puffy, & shell may be all you need
  - Can add and subtract each successive layer without needing to remove the prior one
- Extra fuel & time to melt snow for water
- Dedicated bathroom area and pack-it-in-pack-it-out

Closing thought….protect **winters** and **access**
(Great article on glaciers in current *Mountaineer*)

How you can help

Across the North Cascade Range, we've witnessed a 35-50% loss of ice in the past decade, translating to a rate of 1.5 meters of ice thickness lost per year. For many of the relatively small alpine glaciers in the North Cascades, this rate of loss has resulted in extinction.

In addition to environmental consequences, glacier loss significantly impacts our recreational experiences by altering climbing routes, increasing rockfall risk in newly deglaciated areas, and creating unstable ice caves. No longer can you

The Mountaineers is committed to doing our part to respond to the climate crisis by advocating for public lands protections and investments in climate action, reducing our organizational carbon footprint, and educating the outdoor community by publishing books and other content that promote climate solutions, sustainability, and stewardship. For more information, visit: www.mountaineers.org/conservation.

Be safe, have fun, learn something, and maybe get to the summit!

Photo: Eldorado Peak, June 25, 2015 (Forbidden peak in background)

Thank you

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