



2. RGIK Inventorying: Geomorphological Approach

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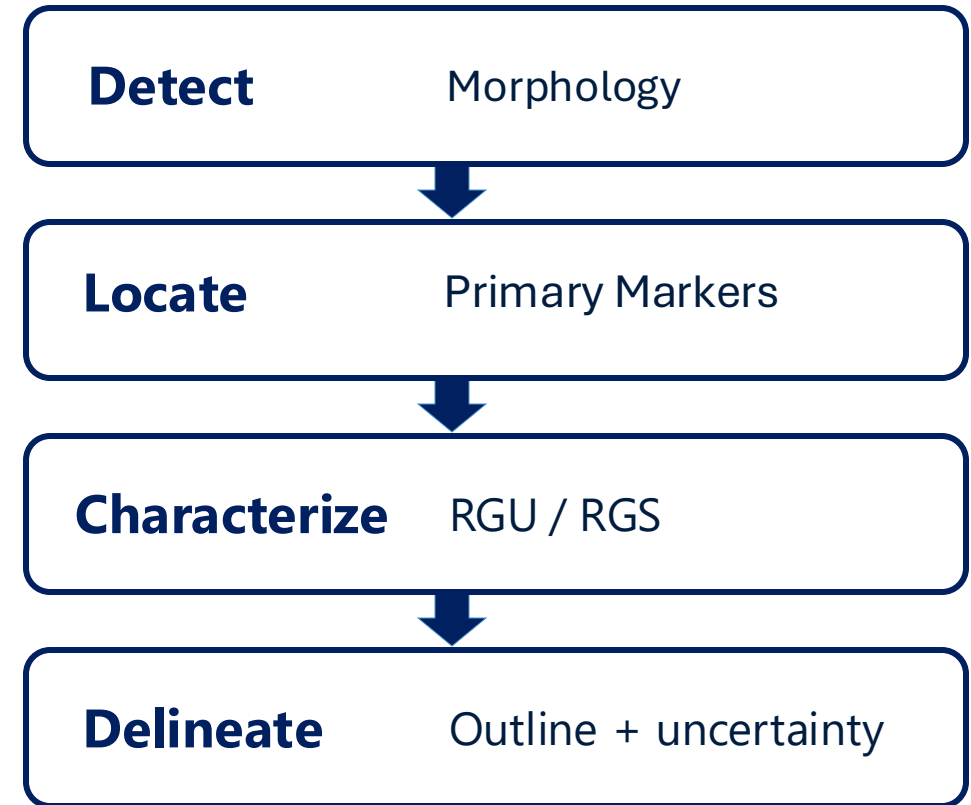


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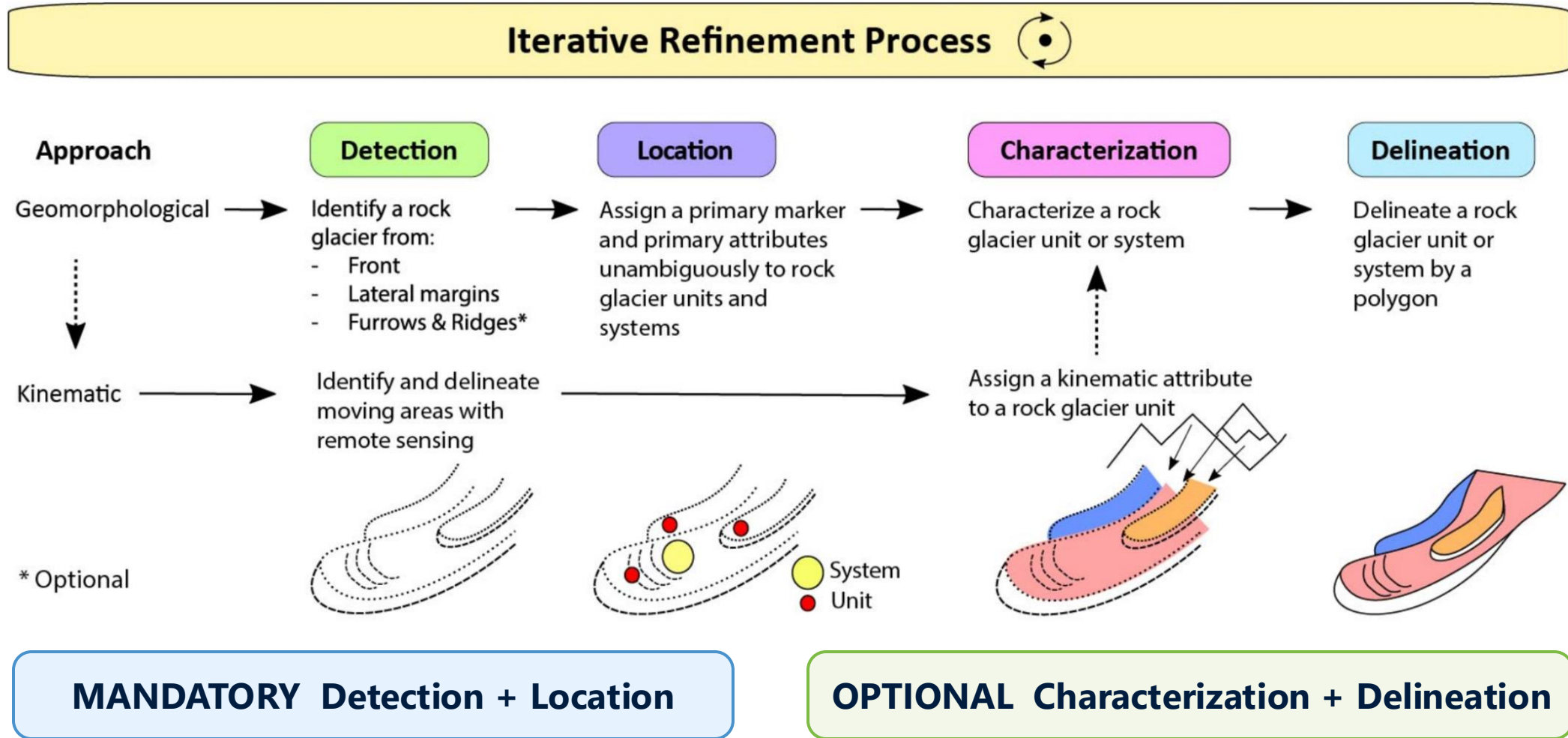
permacost.eu & cost.eu/actions/CA24157

RoGI Workflow: four decisions

- Detect: is this a rock glacier?
- Locate: where should each PM sit?
- Structure: one unit or several?
- Delineate: which boundary is defensible?



Mandatory + Optional Steps



- RGU (Level 1): one unambiguously identifiable landform according to distinct formation timing, upslope connection, activity.
 - Simple morphology – homogeneous criteria
 - Complex morphology – spatial variability
- RGS (Level 2): one or more spatially connected RGUs.
 - Mono-unit system
 - Multi-unit system

MONO-UNIT SYSTEM



MULTI-UNIT SYSTEM



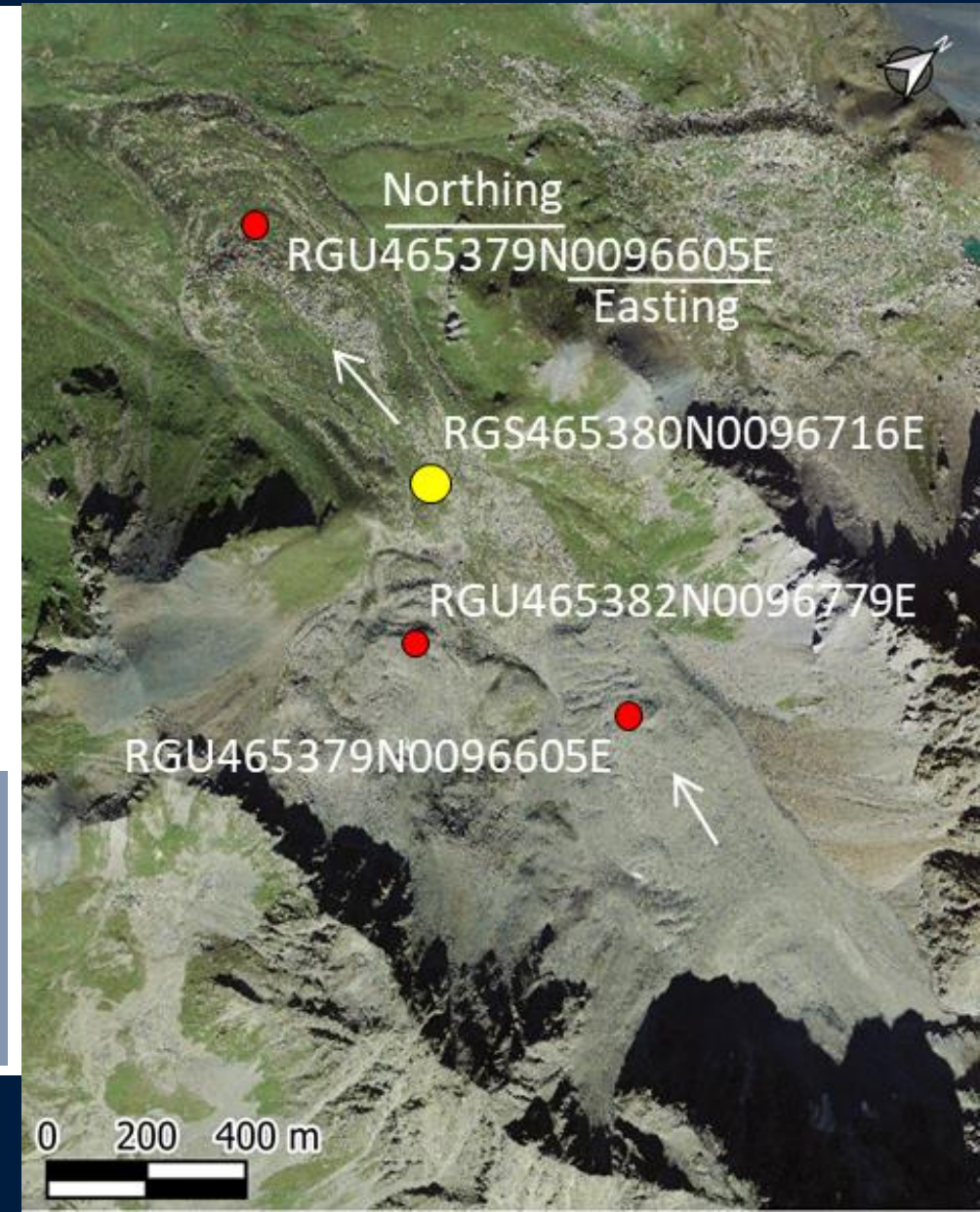
Simple or complex RGU



Primary markers (PM) locate rock glaciers

- Mandatory for every RGU and every RGS.
- Place the PM inside the lower half, not far from the front.
- Use the PM to link primary IDs (automatic in QGIS), attributes and hierarchy.

Tellers Davains,
Switzerland
46.5383°N, 9.6775°E
2200-2800 m.a.s.l.

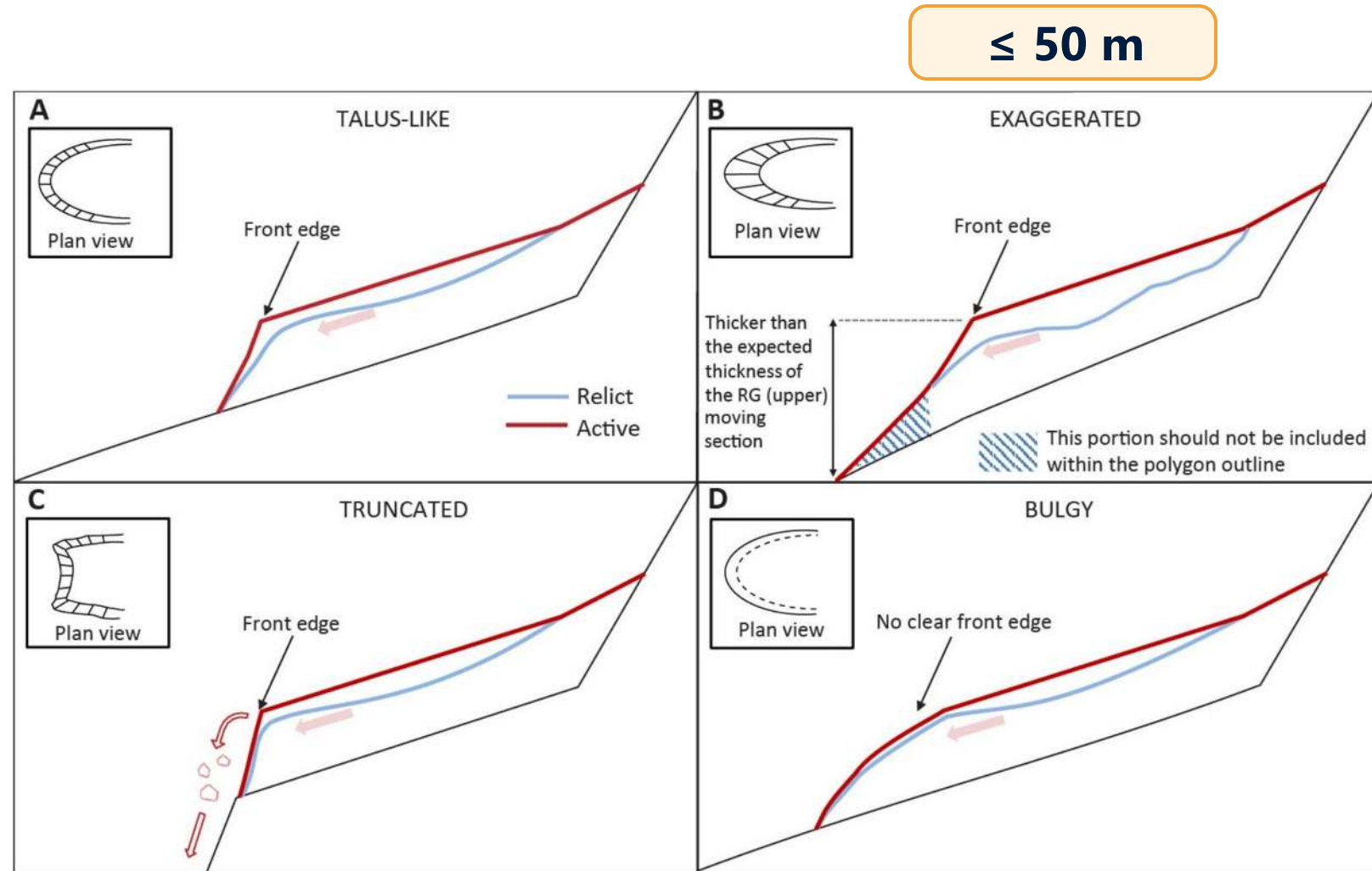


- **Extended:** includes the entire front and lateral margins; pay attention to exaggerated and truncated talus front.
- **Restricted:** excludes the external parts (front and lateral margins).
- Both extend upslope to the rooting-zone boundary.
- **In the exercise, at least delineate the extended outlines.** If time permits: both.

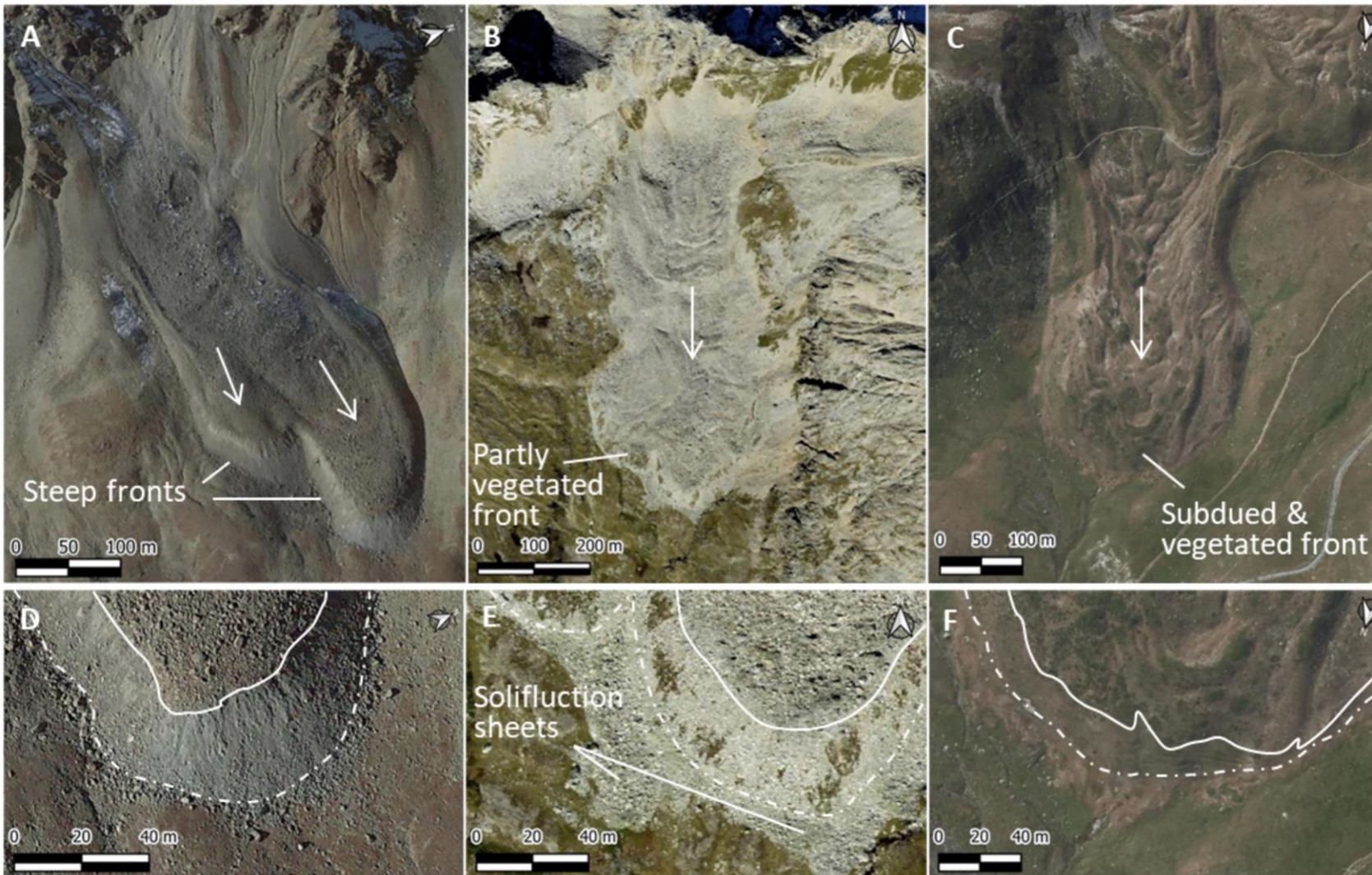
An outline should be drawn only if sufficient geomorphological evidence is available.

Delineate the front

- Restricted: follow the upper front edge / strongest convexity.
- Extended: follow the base of the frontal talus.
- Use slope angle, texture, colour, shadow, vegetation and snow as supporting clues.
- For exaggerated or truncated fronts, limit horizontal separation.



Outlines: active/transitional/relict fronts

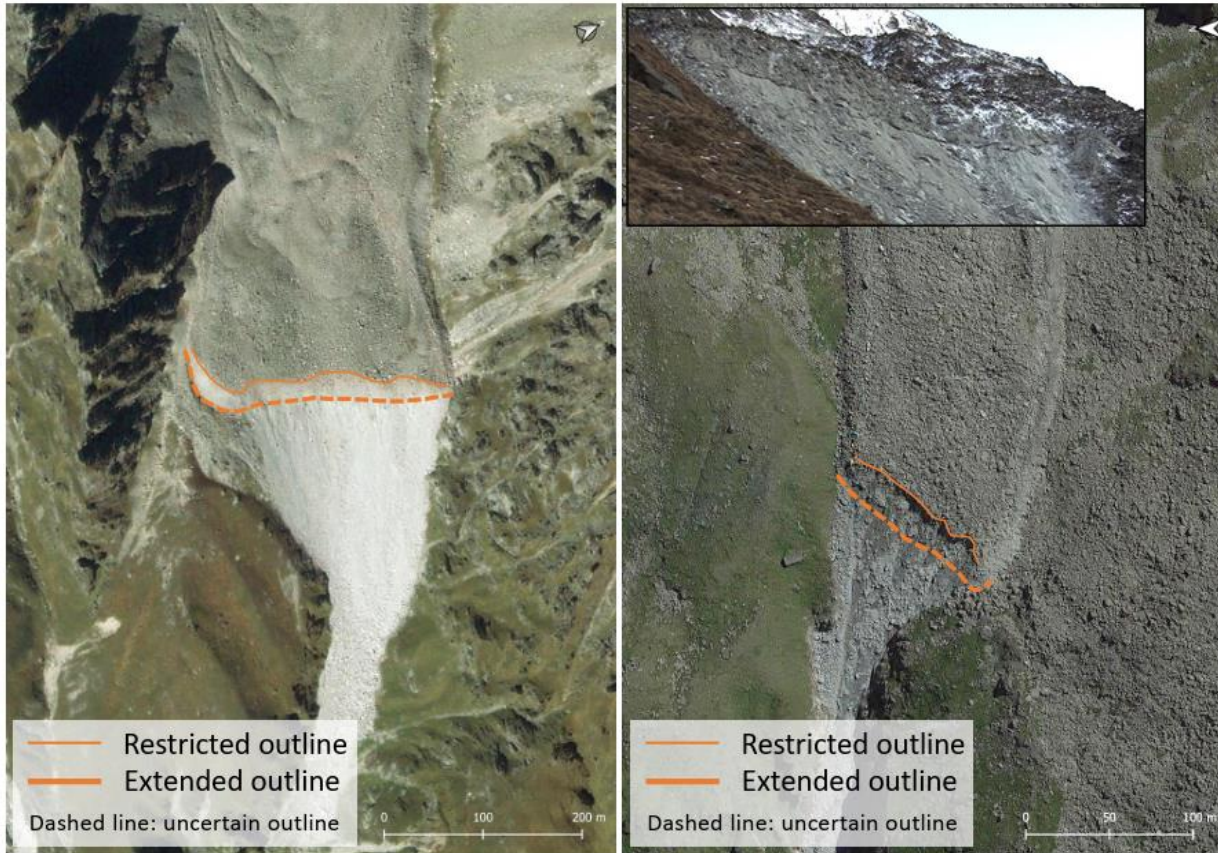


(a) Active rock glacier at Piz da las Sterlas, Switzerland (46.5130°N, 9.9600°E, 2700–2900 m a.s.l.) (Date: 17/10/2022).

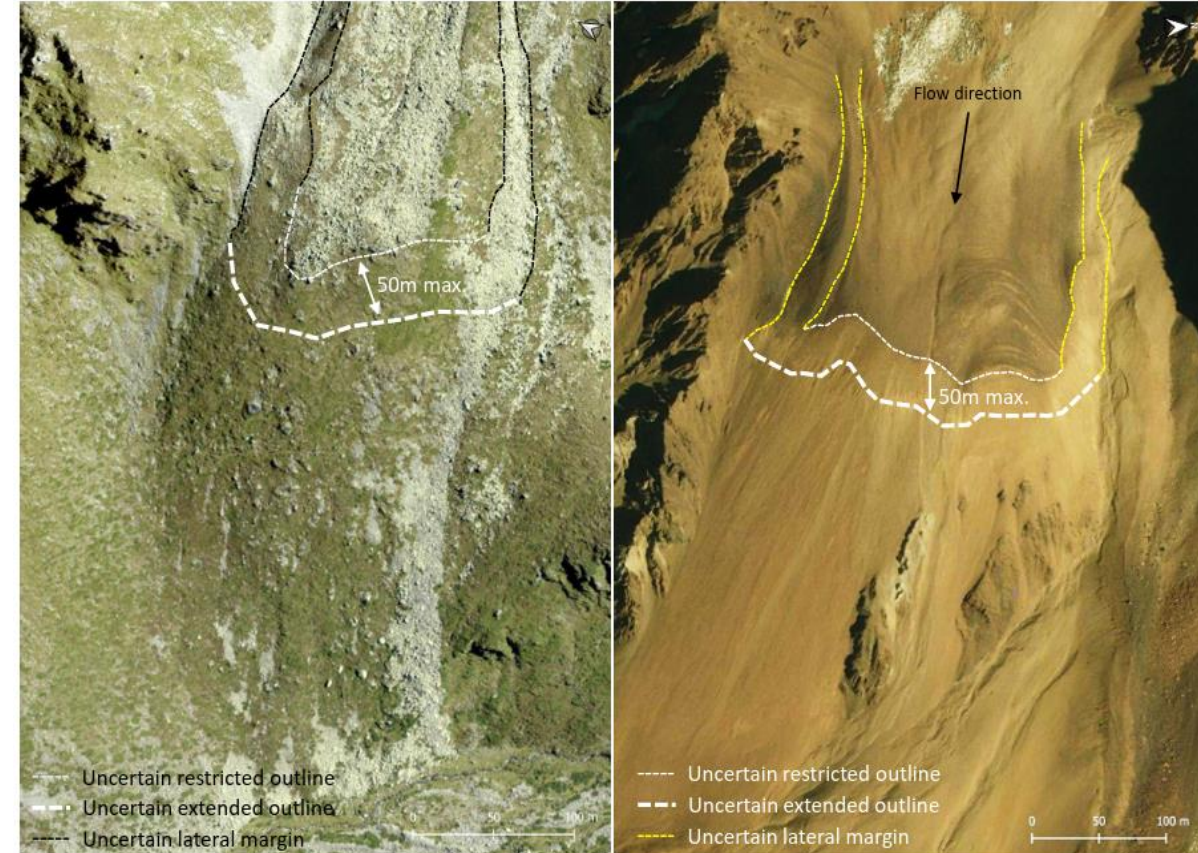
(b) Transitional rock glacier at Cima di Gana Bianca, Switzerland (46.4667°N, 8.9843°E, 2350–2500 m a.s.l.) (Date: 26/10/2019).

(c) Relict rock glacier at Lanserlia, France (45.3487°N, 6.8405°E, 2300–2450 m a.s.l.) (Date: 24/07/2022).

Examples of truncated fronts



Examples of exaggerated fronts

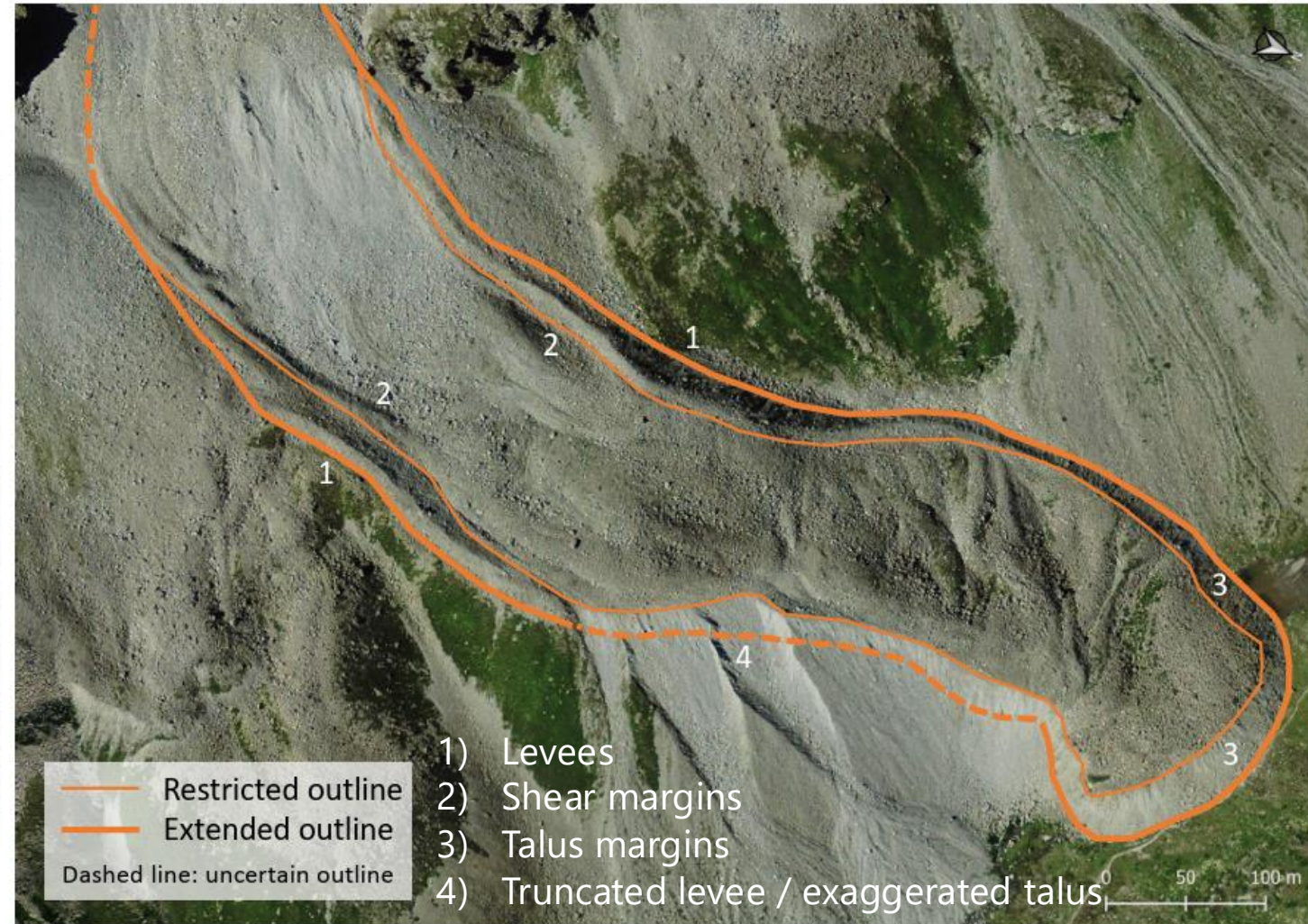


Delineate the lateral margin

Margin type	Main cue	Restricted	Extended
Talus-margin	Slope break / talus geometry	Exclude talus	Include talus
Levee	Topographic ridge + inner shear	Inner side / shear margin	Outer side; keep distance short
Shear-margin	Line of differential motion	Follow the shear line	Same as restricted if no levee

Outlines: lateral margins

Classical talus margins with restricted and extended lateral outlines merging in the upper part



Delineate the upslope boundary

Connection	Place the upper boundary at...	Do not include...
Talus	Basal depression, slope break, or texture and colour change / first discernible creep evidence	The talus source slope
Debris-mantled slope	Highest clear evidence of creep	The debris-mantled source zone
Landslide	Lowermost landslide deposit / permafrost creep evidence	The landslide body
Glacier	Transition to creep morphology; expect high uncertainty	Debris-covered glacier or dead ice
Glacier-forefield	Geomorphological or kinematic evidence of motion; expect high uncertainty	Fluted moraines or dead ice

Restricted and extended lateral outlines often converge at the upslope boundary.

Glacier connections require caution

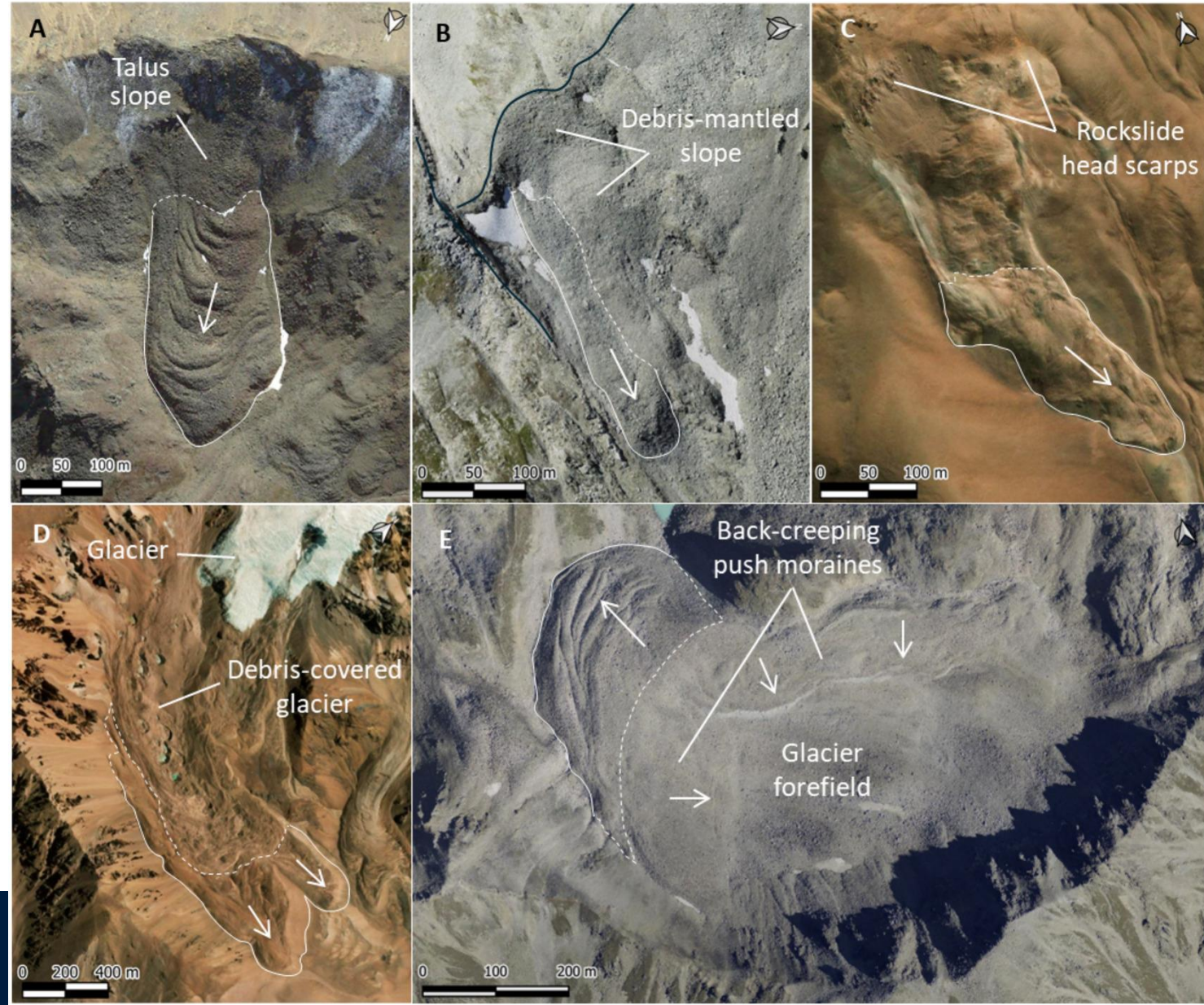
Indicative feature	Rock glacier	Debris-covered glacier
Transverse ridges and furrows	Frequent	Infrequent
Talus-like front	Frequent	Infrequent
Crevasses with exposed ice	Infrequent	Frequent
Abundant thermokarst	Infrequent	Frequent
Abundant supraglacial lakes	Infrequent	Frequent
Ice cliffs	Infrequent	Frequent
Supraglacial streams/channels	Infrequent	Frequent
Subsidence rate (order of magnitude)	$\sim \text{cm yr}^{-1}$	$\sim \text{m yr}^{-1}$
Flow-field coherence	High	Reduced due to differential melt

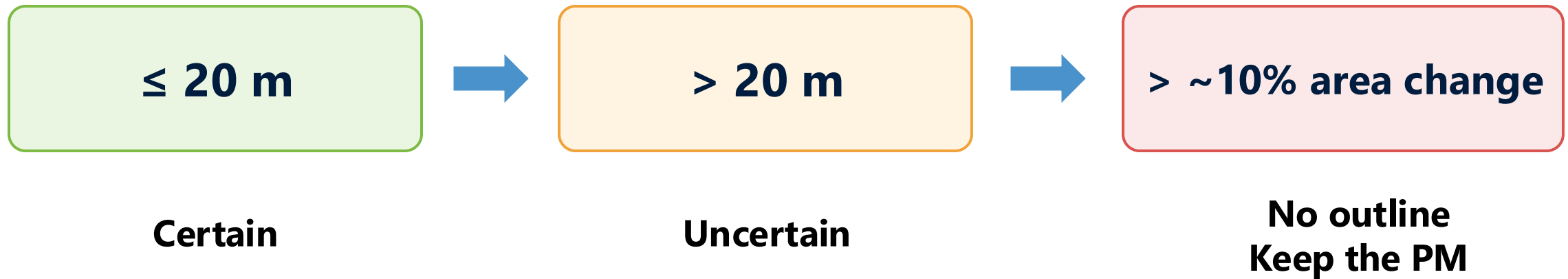
The transition may remain arbitrary and highly uncertain. Direct geophysical evidence may be needed.

Outlines: upslope boundary

The upper boundary is often the most challenging outline to draw.

When unsure (e.g. in case of unclear limit with a debris-covered glacier or a glacier forefield), follow the topography and document the uncertainty (e.g. low reliability)





The level of reliability (low, medium, high) **can be documented differently for the different outline locations** (front, upslope, left lateral margin, right lateral margin).

Always record the data source (optical imagery), acquisition date, mapper/reviewer, and the reason for uncertainty.

- Does it meet the rock glacier definition?
 - Place the RGU PM inside the lower-half, not far from the front.
 - Simple or complex RGU?
 - Can the outline be delineated? Draw the extended outline in priority.
- What is the upslope connection, front, and lateral margin type?
 - Document the reliability / uncertainty level of each segment.
 - Which decision needs kinematic evidence?

Map individually -> Discussion -> Revisit when kinematics are added

