

- 679 Yang K, Smith LC, Sole A, Livingstone SJ, Cheng X, Chen Z and Li M (2019) Supraglacial rivers on the Northwest
 680 Greenland Ice Sheet, Devon Ice Cap, and Barnes Ice Cap mapped using Sentinel-2 imagery. *International Journal*
 681 *of Applied Earth Observation and Geoinformation*, **78**, 1–13, ISSN 1872826X (doi: 10.1016/j.jag.2019.01.008)
- 682 Yang K, Smith LC, Cooper MG, Pitcher LH, As DV, Lu Y, Lu X and Li M (2021) Seasonal evolution of
 683 supraglacial lakes and rivers on the Southwest Greenland Ice Sheet. *Journal of Glaciology*, ISSN 00221430 (doi:
 684 10.1017/jog.2021.10)

685 APPENDIX A

686 The elements of image interpretation used to guide the development of this framework, as described by
 687 Shellito (2018).

Element	Description
Size	Relative size of different objects in an image or known dimensions of one object can provide clues to interpreting those objects.
Tone	The intensity of color in an object. Tone can provide contrast with surrounding objects to aid in interpretation.
Texture	Differences or similarities in tone throughout an image, such as coarse or smooth.
688 Location	Known site characteristics of a particular location can aid in interpreting an object.
Shape	The form of objects in an image, such as circular, linear, or sinuous.
Pattern	Physical arrangement of objects in an image. The relationship between objects (such as ordered, or being disarrayed) aids in image interpretation.
Shadow	Shading cast by light shining onto an object. Shadows can provide information about the height or depth of an object, as well as the overall structure.
Association	Image objects can be associated with other nearby objects giving an object context for interpretation.

689 APPENDIX B

690 Stream model polylines are classified as high, moderate, or low confidence, or as error streams, based on the
 691 criteria defined below. These criteria are visualized in the main text, but written out here as an alternative.

692 High-confidence streams are defined as follows (Fig. 11):

693 The feature is curvilinear, exhibits a smooth texture and is white or blue in tone relative to its'
694 surrounding (aerial imagery).

695 Or

696 The feature exhibits a brightness consistent with the features' shape (elevation depression) relative to
697 its surrounding (Hillshade model); and the feature exhibits a light grey or white tone, indicating the
698 presence of water ($NDWI_{ice}$).

699 Moderate-confidence streams are defined by the following characteristics:

700 The feature exhibits a brightness consistent with the features' shape (elevation depression) relative to
701 its surrounding (hillshade model).

702 Or

703 The feature exhibits a light grey or white tone, indicating the presence of water ($NDWI_{ice}$).

704 Low-confidence streams are not curvilinear and smooth in texture, and lack evidence in the supporting
705 layers that would be needed to classify a stream as high- and moderate-confidence. As seen in Fig. 12, the
706 low confidence stream is disjointed (not curvilinear), a result of the flow accumulation calculation forcing
707 flow in areas without streams. Error streams are defined by the same characteristics as low confidence
708 streams, but exist downslope of a moulin.

709 Additional features were identified which interacted with the stream model polylines, moulins, crevasses,
710 and ice cauldrons. Moulins were identified by the following characteristics:

711 The feature is situated at the terminus of a high-confidence stream; the feature is circular or nearly
712 circular in shape and exhibits a difference in tone relative it its surrounding (aerial imagery); and the
713 feature is located in an elevation sink (sink Model).

714 Or

715 The feature is situated at the terminus of a high-confidence stream; the feature is circular or nearly
716 circular in shape and exhibits a difference in tone relative it its surrounding (aerial imagery); and the
717 feature exhibits a light grey or white tone, indicating the presence of water ($NDWI_{ice}$).

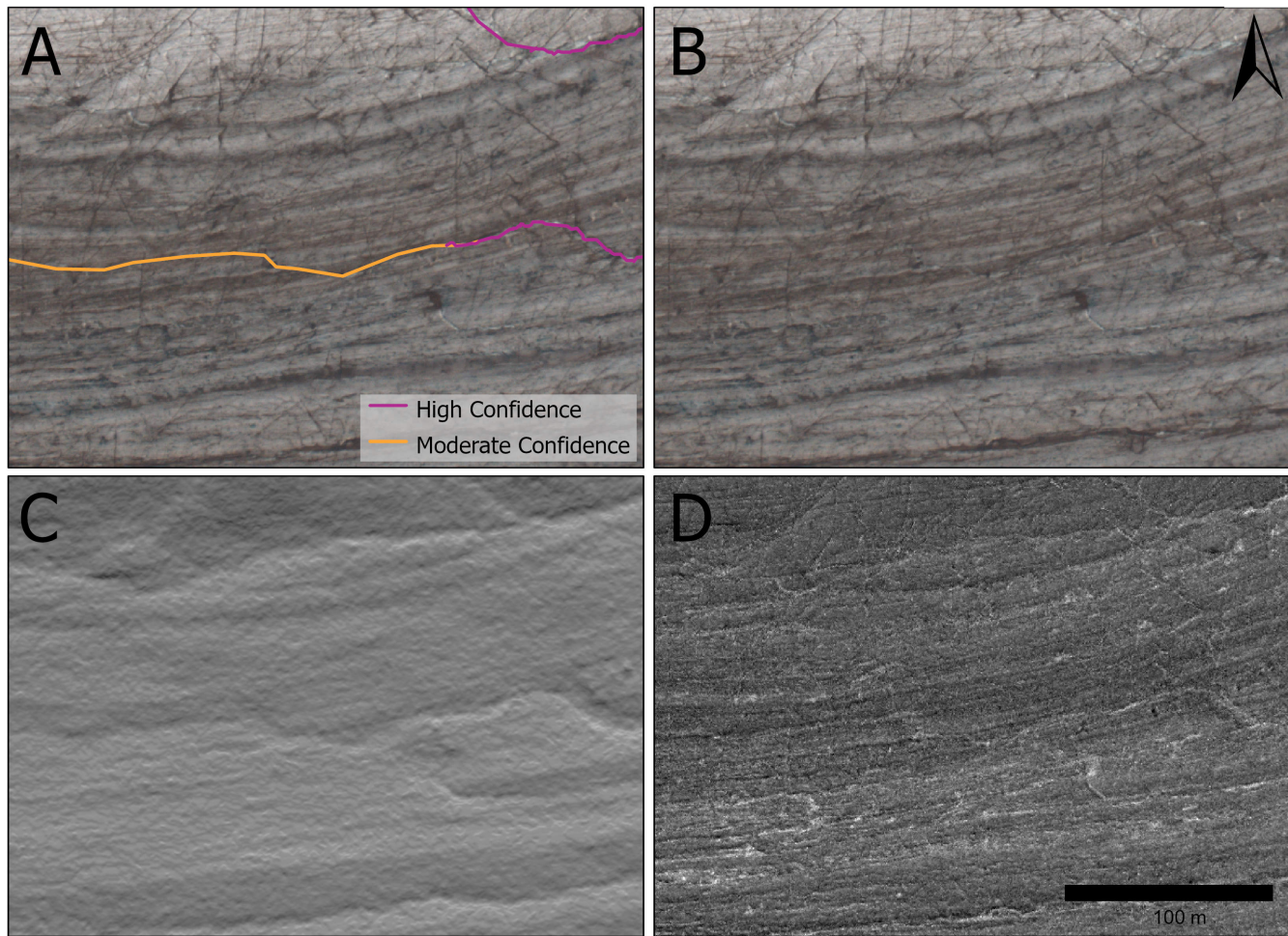


Fig. 11. An example from Nälüdäy of (A) delineated moderate- and high-confidence streams shown over the high resolution orthomosaic (0.5 m). (B) High resolution orthomosaic without stream delineated, illustrating that, unlike high-confidence streams, moderate-confidence streams do not exhibit white or blue tone. (C) Hillshade model, showing the brightness consistent with a depression at the stream location; (D) $NDWI_{ice}$ model, showing a light tone relative to the surroundings at the stream location.

718 Water-filled crevasses are defined by the following characteristics:

719 The feature follows or intersects a high- or moderate-confidence stream (stream model); the feature is
 720 linear, oriented approximately perpendicular to the direction of ice flow and is in the same orientation
 721 as neighbouring crevasses (aerial imagery); and the feature exhibits a light grey or white tone, indicating
 722 the presence of water ($NDWI_{ice}$).

723 Water-free crevasses are defined by the following characteristics:

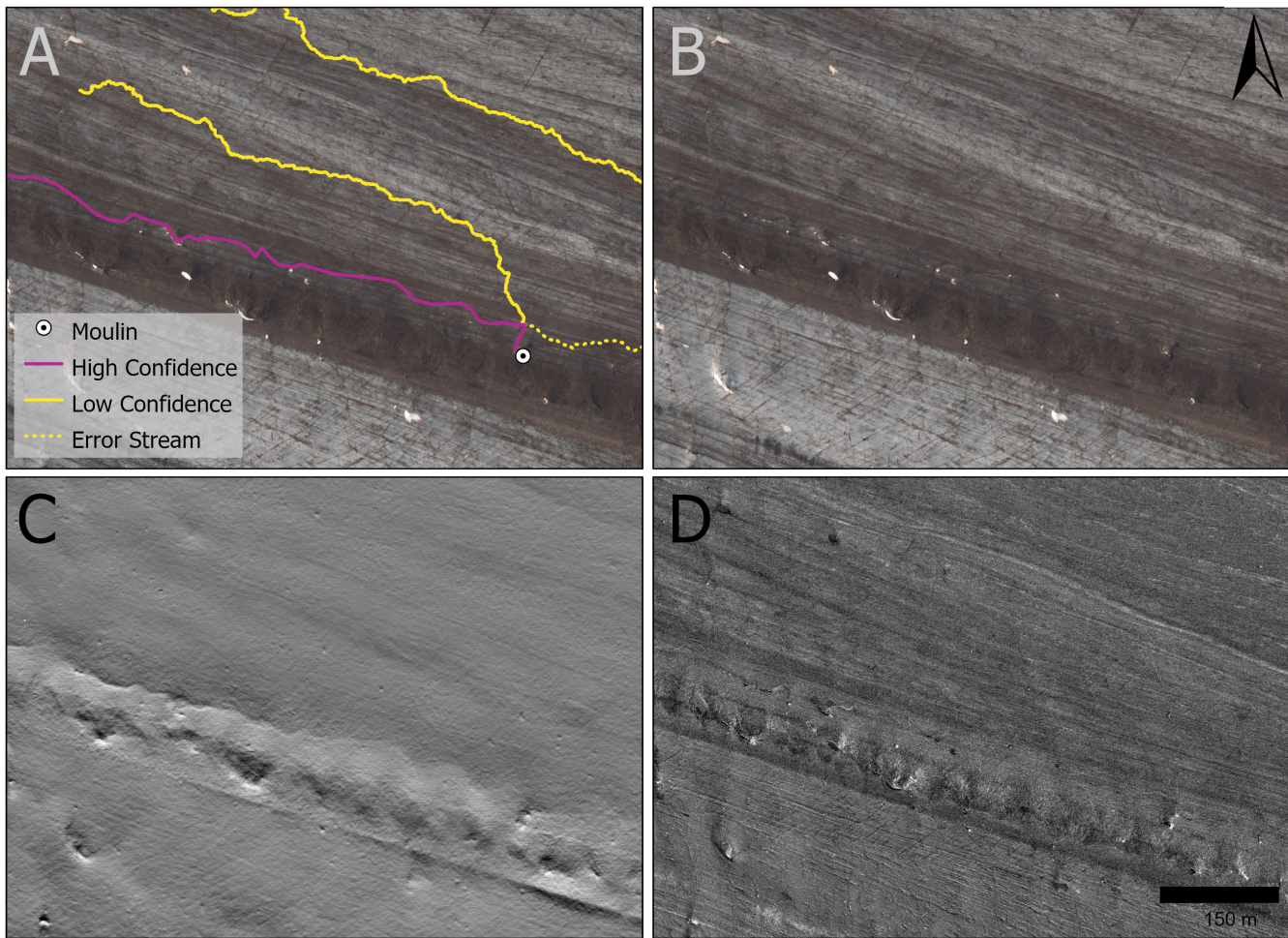


Fig. 12. An example from Nàlùdäy of (A) delineated low- and high-confidence streams shown over the high resolution orthomosaic (0.5 m). (B) High resolution orthomosaic without stream delineated, illustrating that, unlike high-confidence streams, low-confidence streams are not curvilinear smooth in shape, do not exhibit white or blue tone; (C) Hillshade model, showing no brightness consistent with a depression at the low-confidence stream location; (D) $NDWI_{ice}$ model, showing no light tone relative to the surroundings at the low-confidence stream location.

724 The feature intersects a polyline (stream model); the feature is linear, oriented approximately
 725 perpendicular to the direction of ice flow and is in the same orientation as neighbouring crevasses (aerial
 726 imagery); and the feature exhibits multiple sinks consistent with the features' shape (sink model).

727 And example of an ice cauldron is show in Fig. 13:

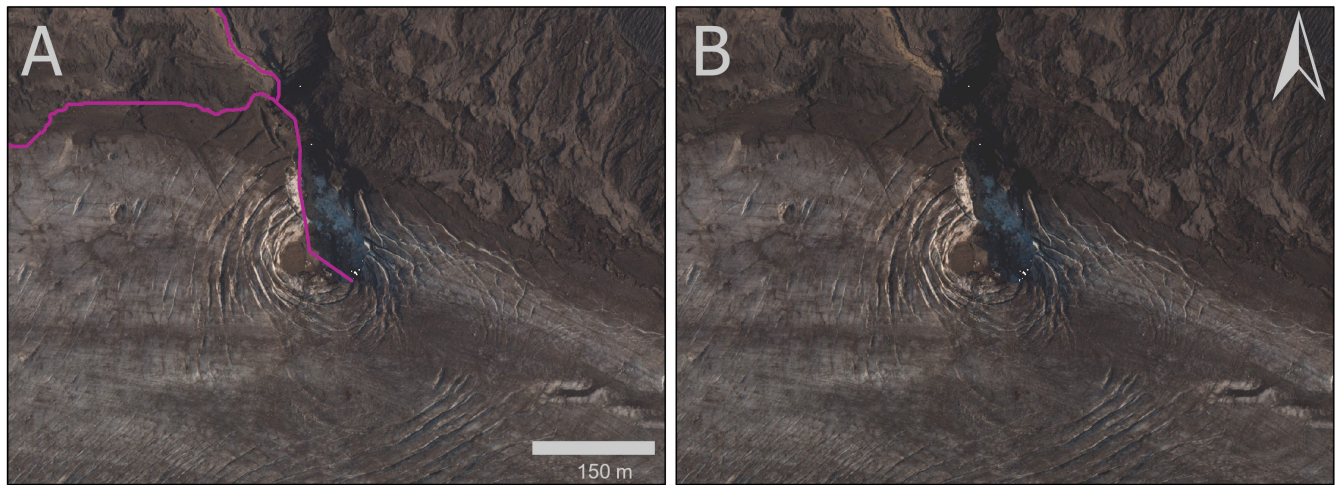


Fig. 13. (A) Ice cauldrons are located at the terminus of high-confidence streams, (B) show brightness in the hillshade model consistent with a depression, and (A,B) contain a pattern of curved concentric lines (crevasses) surrounding their perimeter.