To ensure that the choice of using the Mean Absolute Error (MAE) as similarity score does not degrade the resulting matching maps, we tested two other scores, namely: (1) the normalized cross-correlation and (2) a high-pass filter (cutting wavelength=25m) coupled with a cross correlation (similar to (Fahnestock et al, 2016)). The test is carried out for the period July 13th – July 26th and focuses on a small area to limit the computing time. The results below show that the straight use of the normalized cross-correlation produces the less reliable results with many outliers (in white in the figure). In contrast, the cross correlation tuned for feature tracking in glacier context (i.e. with a preliminary filtering) and the mean absolute differences (the selected option for this manuscript) perform almost perfectly in the test area. In addition, one can notice that these two methods generate almost indistinguishable displacement maps, which tends to show that using mean absolute differences as similarity score results in robust displacement estimates.

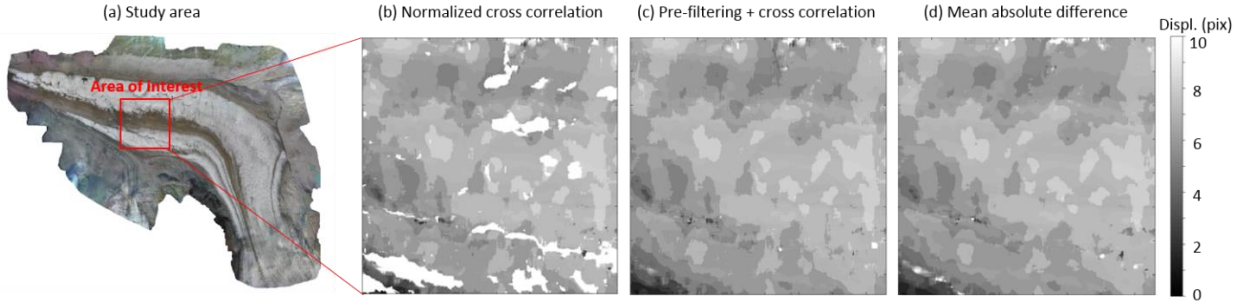

Figure: Surface displacements (July 13th – July 26th) estimated by feature tracking using different similarity scores. (a) Situation map. (b) Displacements estimated by maximum normalized cross-correlation. (c) Displacements estimated by high pass filtering (cutting wavelength = 25 m) and maximum cross-correlation. (d) Displacements estimated by minimum of the mean absolute differences. In (b-d), all parameters of the tracking algorithm besides the similarity score are the same for the three scenarios (search template 201 x 201 pixels, search window 400 x 400 pixels).

Reference:

Fahnestock M., Scambos T., Moon T., Gardner A., Haran T., Klinger M., Remote Sensing of Environment, 185, 84-94, 2016.