Which glacier velocity map has the best quality?

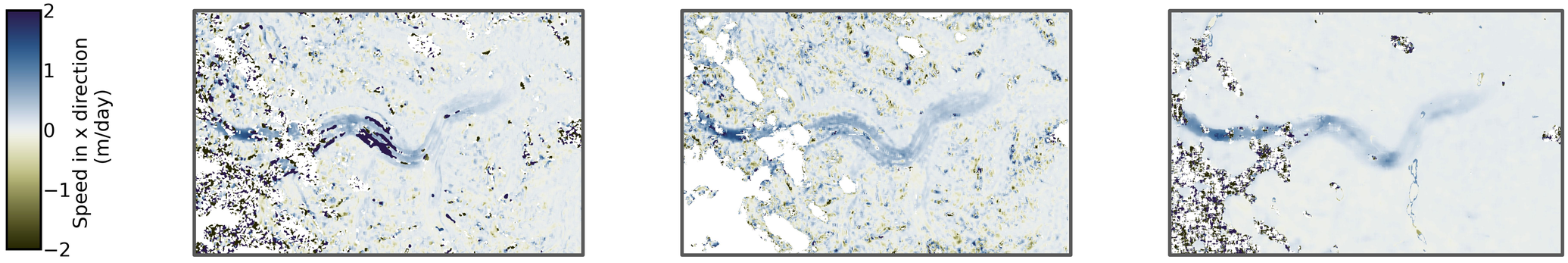

Fig 1. Kaskawulsh glacier (Yukon, Canada) flow speed in E-W. High-speed zone in the middle reveals the main channel. Three maps are derived from the same Landsat 8 pairs (2018.08.02-18) but are prepared using different feature tracking software and parameters. Full width ≅ 55 km.

Having trouble? Introducing GLAFT (GLAcier Feature Tracking testkit)

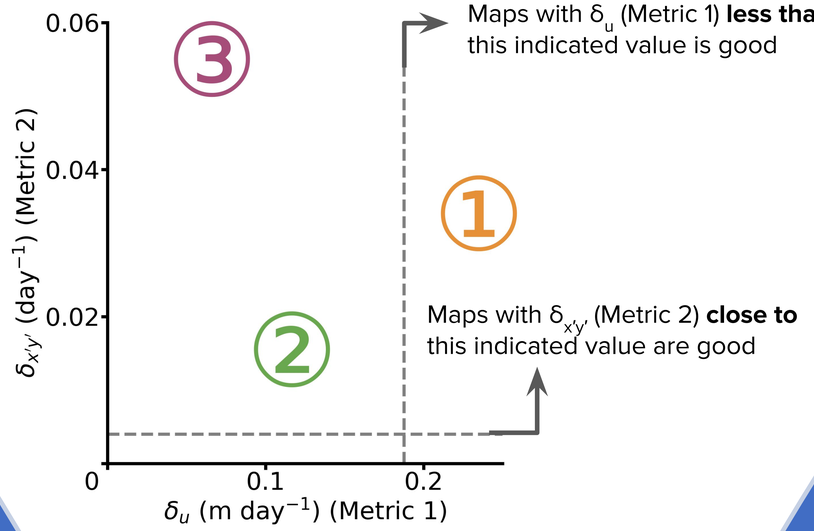

Fig 2. GLAFT-calculated metrics for the three velocity maps above, indicating the data quality.

Try GLAFT:

GLAFT: a statistically and physically based framework built on top of open science workflows for evaluating glacier velocity maps

@WhyjayZ

Whyjay Zheng (whyjz@csrsr.ncu.edu.tw), Shashank Bhushan, Maximillian Van Wyk De Vries, William Kochtitzky, David Shean, Luke Copland, Christine Dow, Renette Jones-Ivey, & Fernando Pérez

USA Berkeley · Taiwan · USA · USA · UK · Canada uOttawa · USA une University of New England · Canada · USA

Why GLAFT?

GLAFT evaluates the quality of glacier velocity maps retrieved from large open data sets (e.g., ITS_LIVE) or derived using custom feature-tracking workflows.

- Refine/smooth the velocity maps based on physics-informed metrics
- Python-based & open sourced
- Cloud access (Ghub) + local installation

What are these metrics?

Metric 1 (δ_u): velocity over static terrain
Standard deviation of the kernel density estimation (KDE) calculated using correctly matched measurements only.

Best if $\leq 0.2 \times \frac{\text{pixel size of source images}}{\text{duration of source image pair}}$.

Metric 2 ($\delta_{x'y'}$): along-flow strain rates at glacier surface
Using the same KDE method from Metric 1.

Best if $\approx \bar{u}_{x'} \frac{2Y}{H^2}$. ($\bar{u}_{x'}$=avg surface along-flow speed Y=channel half-width, H=ice thickness)

For more details, see the GLAFT publication at https://doi.org/10.5194/tc-17-4063-2023 or scan the QR code!