

Kinematics at the Muragl rock glacier in Switzerland

between 2015 and 2022

Sandro Cathomen¹, Johann Junghardt¹, and Isabelle Gärtner-Roer²

¹ Institute of Natural Resource Sciences, ZHAW Zurich University of Applied Sciences, Wädenswil, Switzerland ² Department of Geography, University of Zurich, Zurich, Switzerland

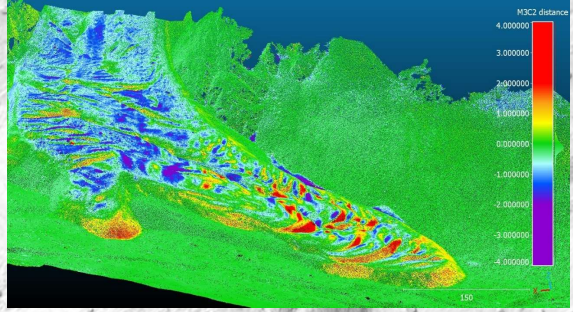
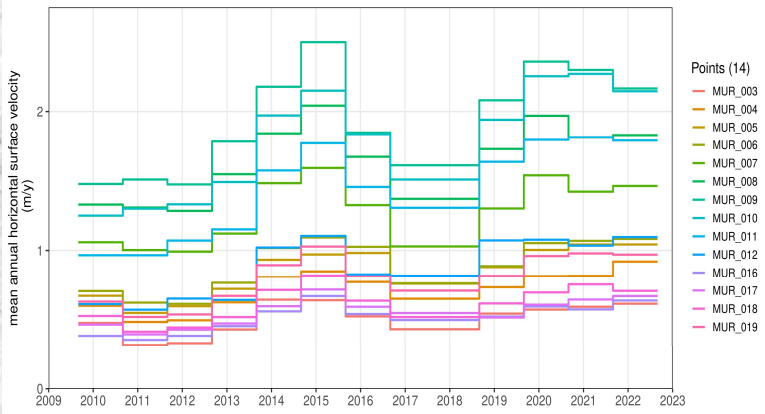


Objective

- Correlations in the UAV data and the terrestrially collected data
- current kinematic and morphological conditions of the Muragl rock glacier
- correlations between kinematics and air/ground temperature
- future trends

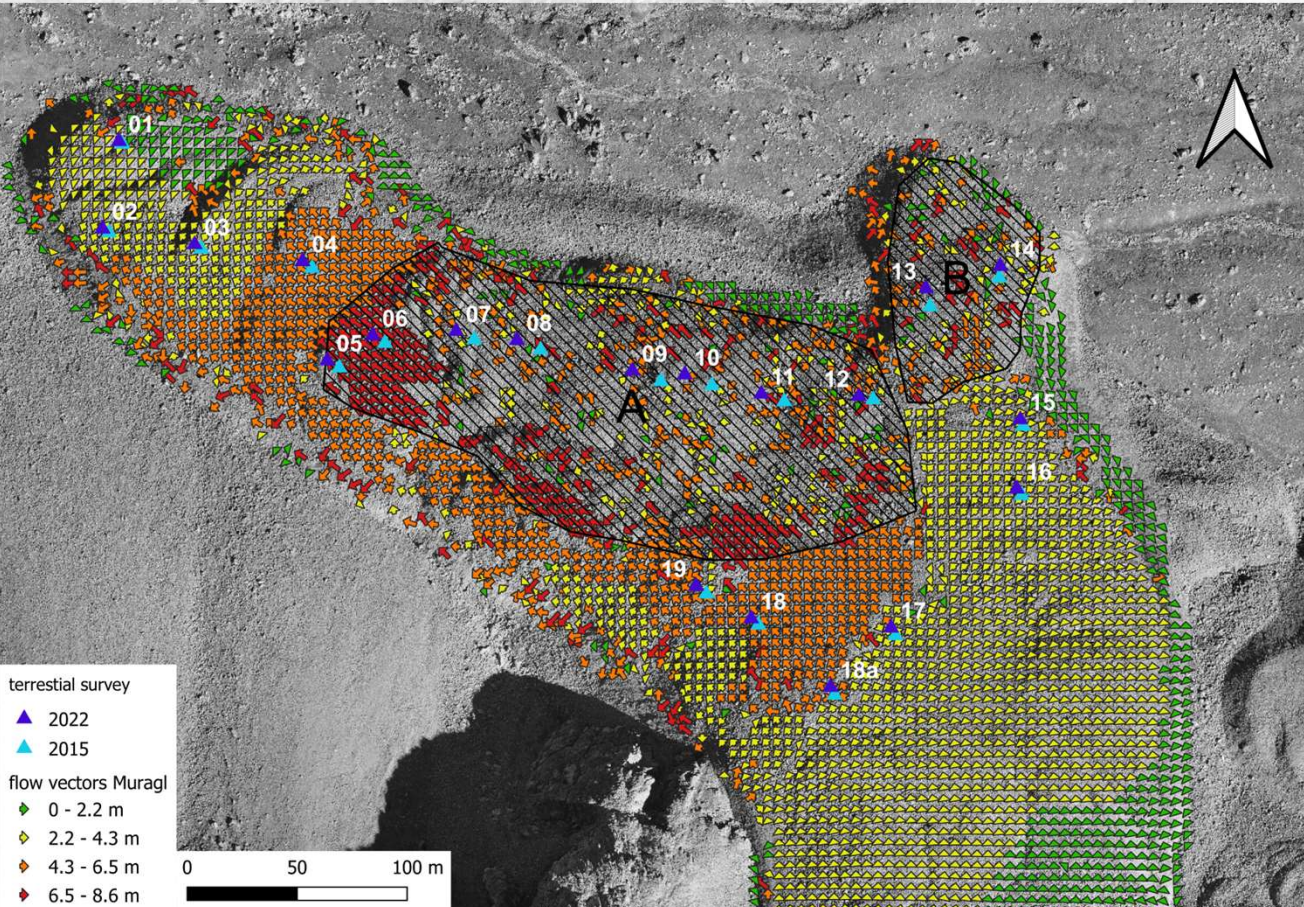
Methods

- unmanned aerial vehicle survey 2015 and 2022
- terrestrial survey (tachymeter)
 - 20 fixed points were measured distributed over the rock glacier
- flow motion model
 - Cloud Compare Software
- Flow vectors model
 - Cias Software



Results and Discussion

- Muragl rock glacier shows local volume changes from 4m increase to 4m decrease from 2015 to 2022
- The maximum measured creep velocities were 13.81m in seven years
- Same pattern shown by Nötzli et. al. 2013 and Käab et. al. 2005
- Winter 2019/2020 first time statewide mean temperature over 0°C (0.7°C)



terrestrial survey
 ▲ 2022
 ▲ 2015

flow vectors Muragl
 ◆ 0 - 2.2 m
 ◆ 2.2 - 4.3 m
 ◆ 4.3 - 6.5 m
 ◆ 6.5 - 8.6 m

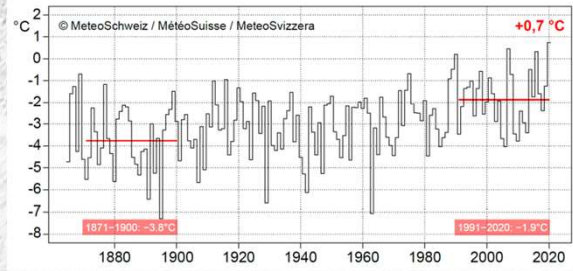
Conclusion

- The two combined methods give a good overview of the kinematics of Muragl and show the same patterns
- Biggest mass movement in zone A & B
- The Muragl rock glacier has locally average creep velocities of up to 2 m/yr. This is relatively high compared to the rock glaciers in the nearer region such as the Murtel-Corvatsch and Schafberg rock glacier.

Outlook

- Max. data collection interval of 3 to 5 years, for better visibility of high velocity areas

ID	Horizontaldistanz [m]	ID	Horizontaldistanz [m]
01	2.04	11	10.96
02	3.38	12	6.66
03	3.65	13	8.38
04	5.29	14	5.19
04	6.39	15	3.23
05	6.56	16	3.78
06	8.98	17	4.05
07	11.60	18	4.37
08	13.81	19	5.88
10	13.30	18a	4.01



scientific sources
 Cathomen, S., Junghardt, J., and Gärtner-Roer, I. Kinematics at the Muragl rock glacier in Switzerland, EGU General Assembly 2023, Vienna, Austria, 24-28 Apr 2023, EGU23-8729, <https://doi.org/10.5194/egusphere-egu23-8729>, 2023.
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