

Modelling blue-green water fluxes in mountain headwaters at the climatic ends of High Mountain Asia

EGU'22, May 24

Stefan Fugger

Pascal Buri

Thomas E. Shaw

Achille Jouberton

Evan Stewart Miles

Simone Fatichi

Michael McCarthy

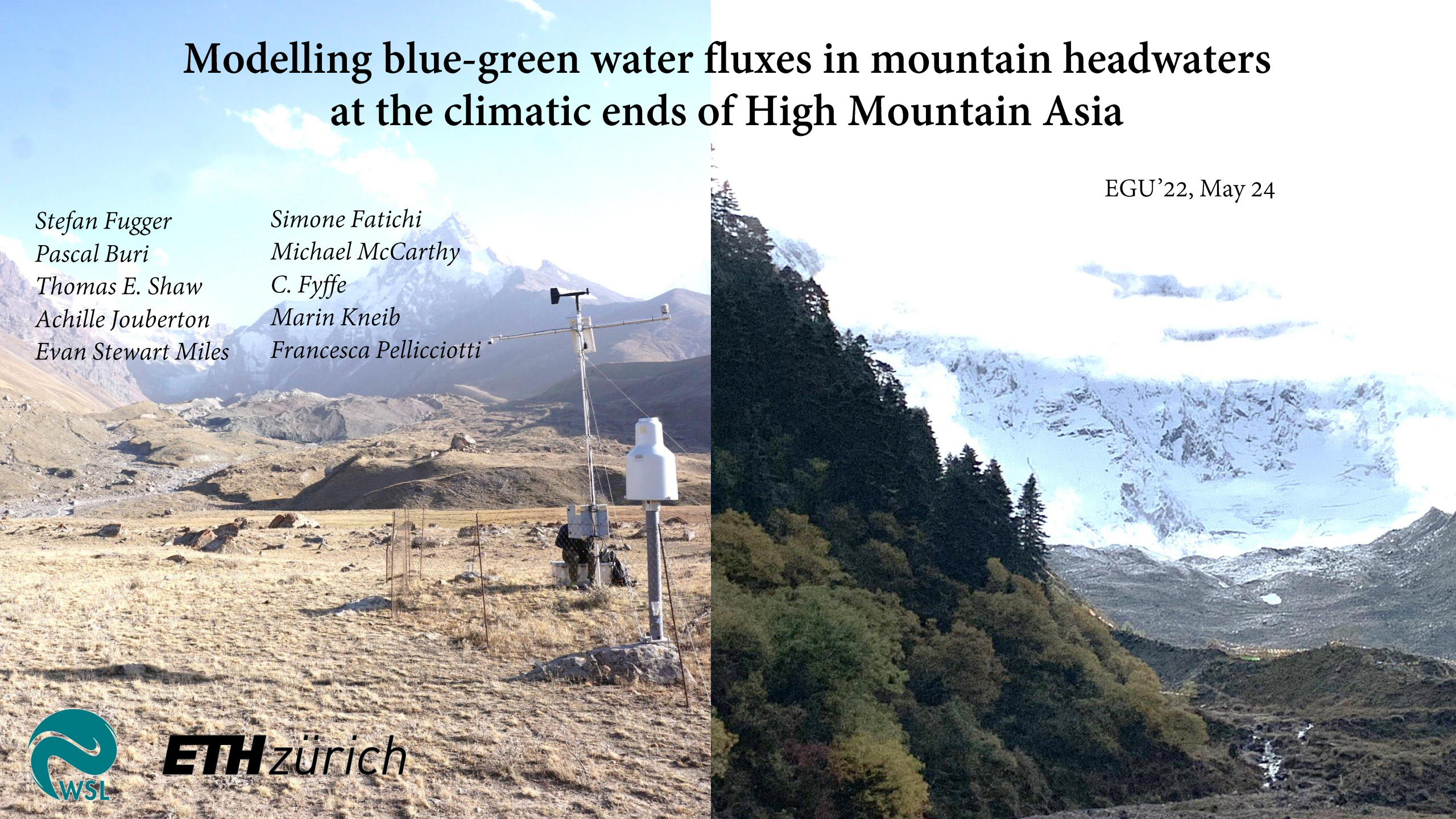
C. Fyffe

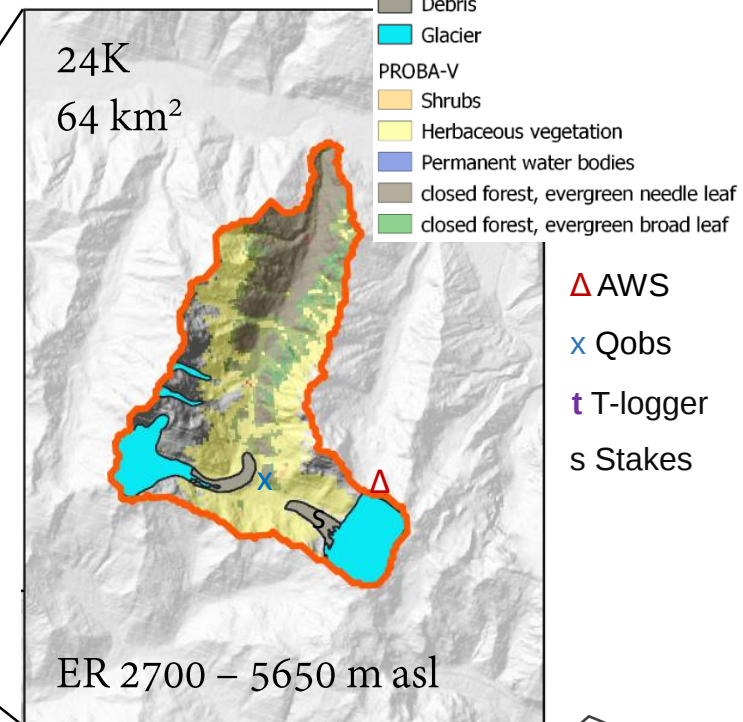
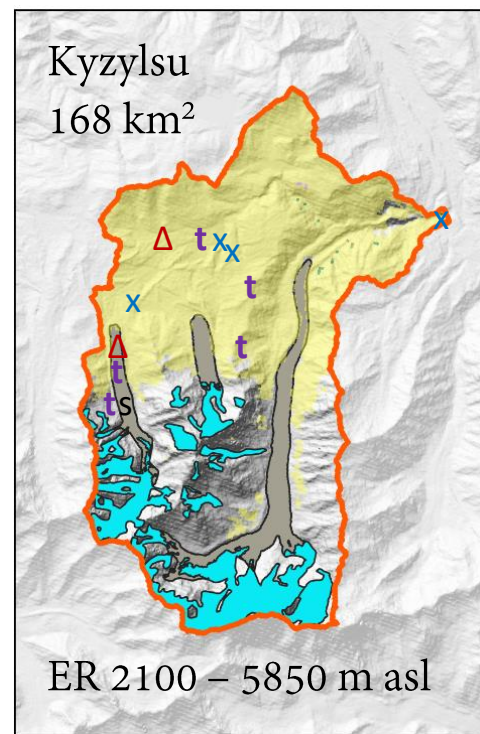
Marin Kneib

Francesca Pellicciotti



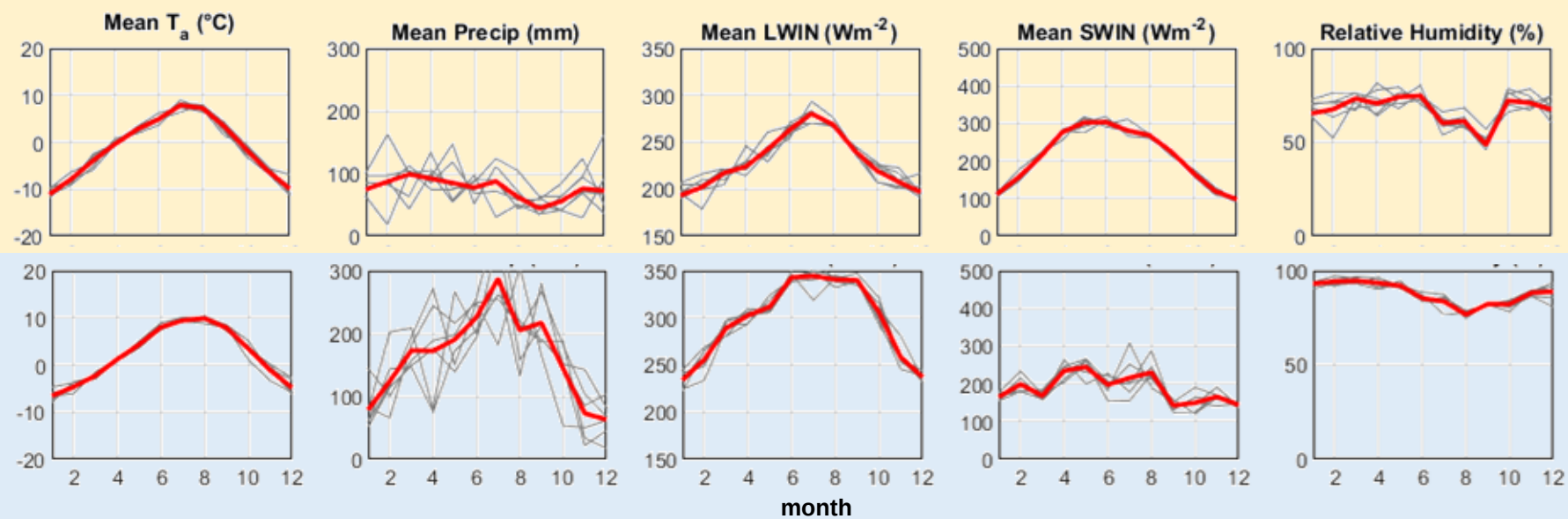
ETH zürich





- Basin_outline
- Debris
- Glacier
- PROBA-V
- Shrubs
- Herbaceous vegetation
- Permanent water bodies
- closed forest, evergreen needle leaf
- closed forest, evergreen broad leaf

- △ AWS
- × Qobs
- † T-logger
- s Stakes



Motivation

Do sophisticated land surface models enable a more robust representation of the water balance of glacierised headwater catchments?

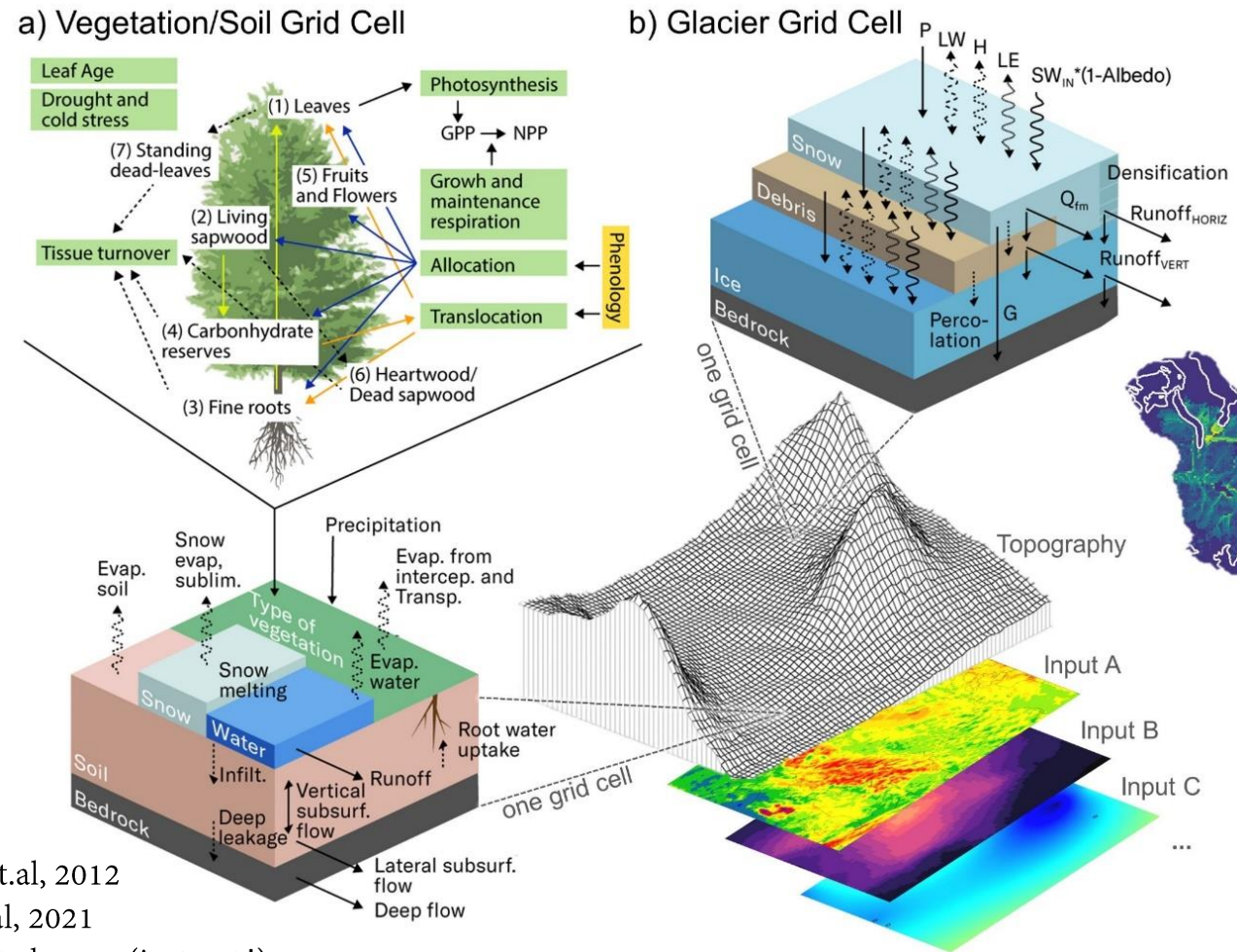
Forcing

ERA5-Land

downscaled & bias-corrected

100m spatial, 1hr temporal res.

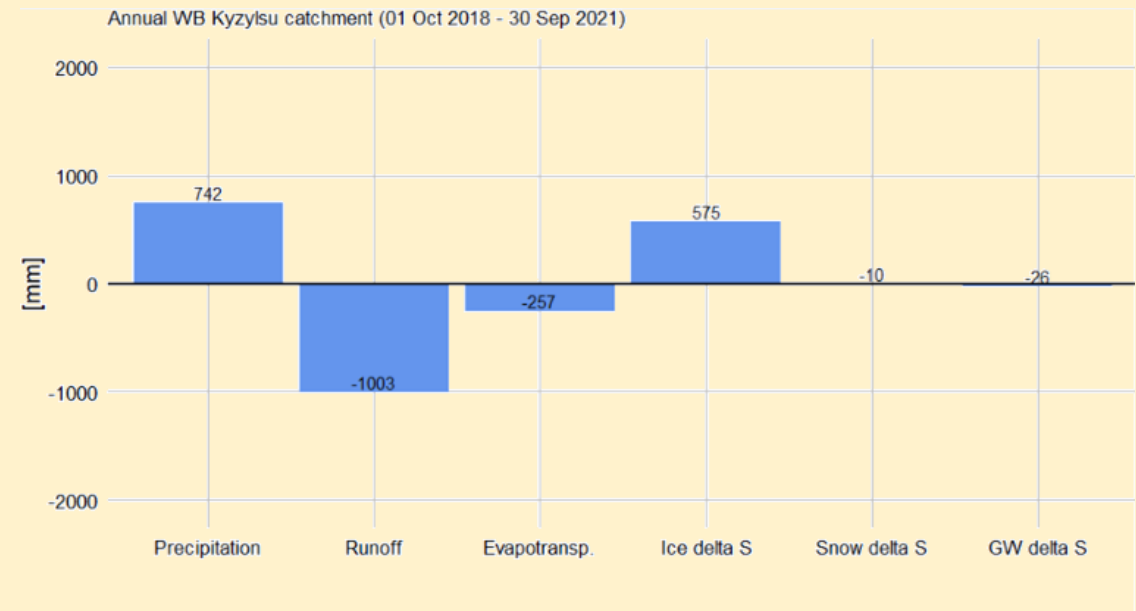
T&C model



e.g. Fatichi et.al, 2012
Fyffe et.al, 2021
Fugger et.al, 2022 (just out !)

Kyzylsu

- Runoff > Precipitation
- Ice loss ~ 2 x ET

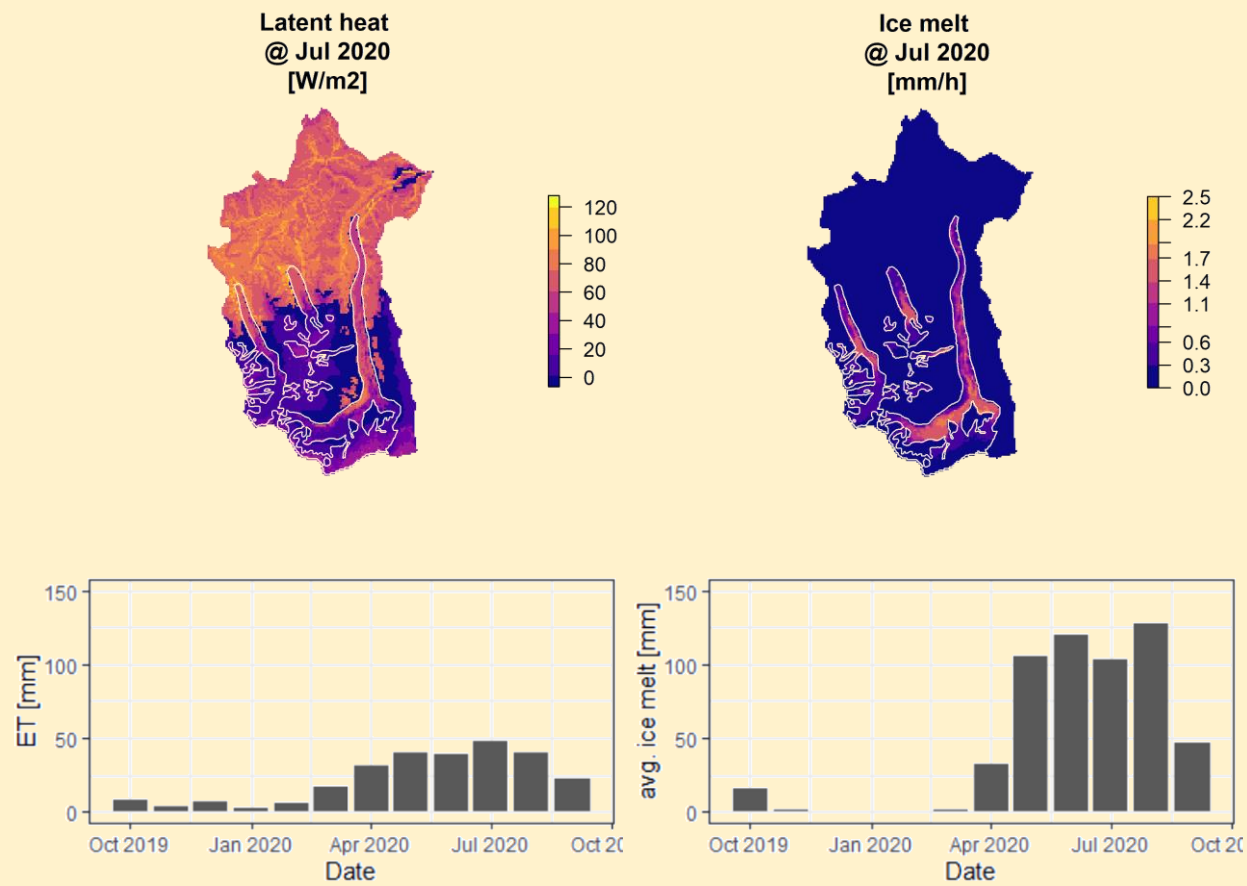


24K

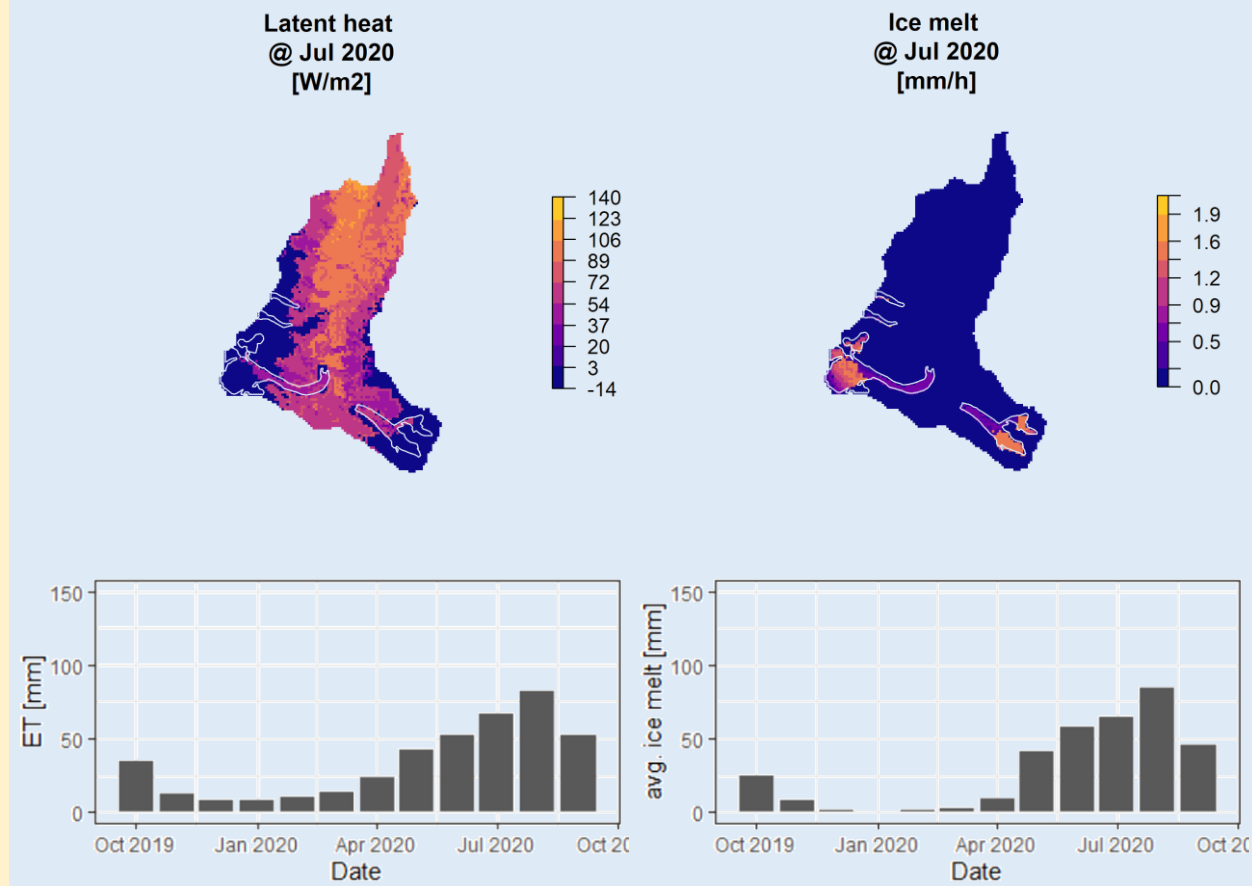
- Runoff ~ Precipitation
- ~ 3x Precipitation compared to Kyzylsu
- Ice loss ~ ET

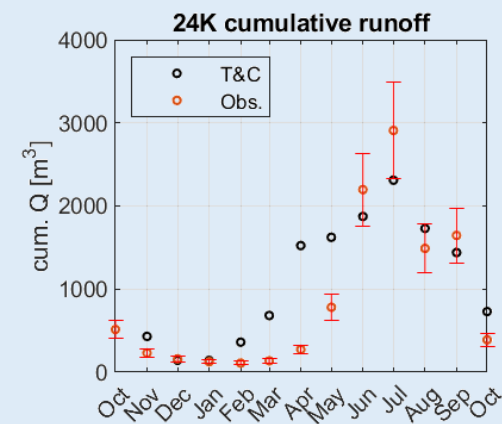
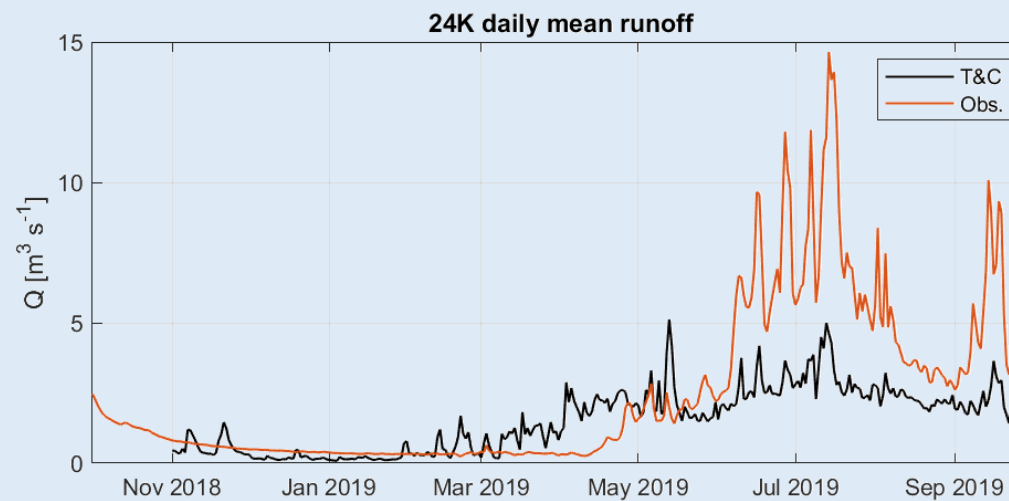
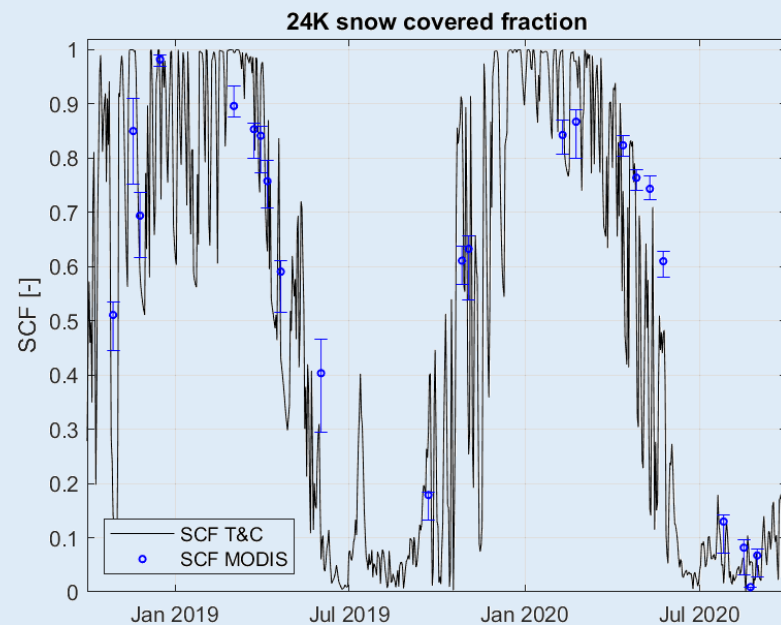
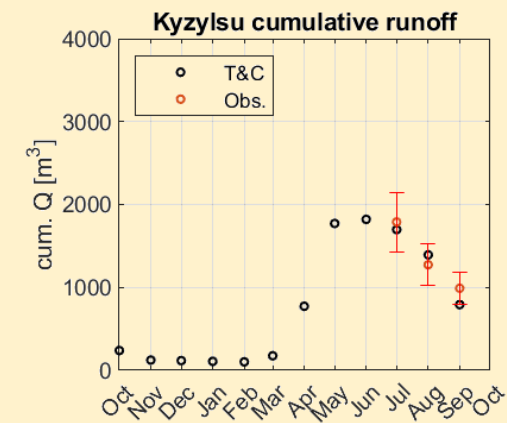
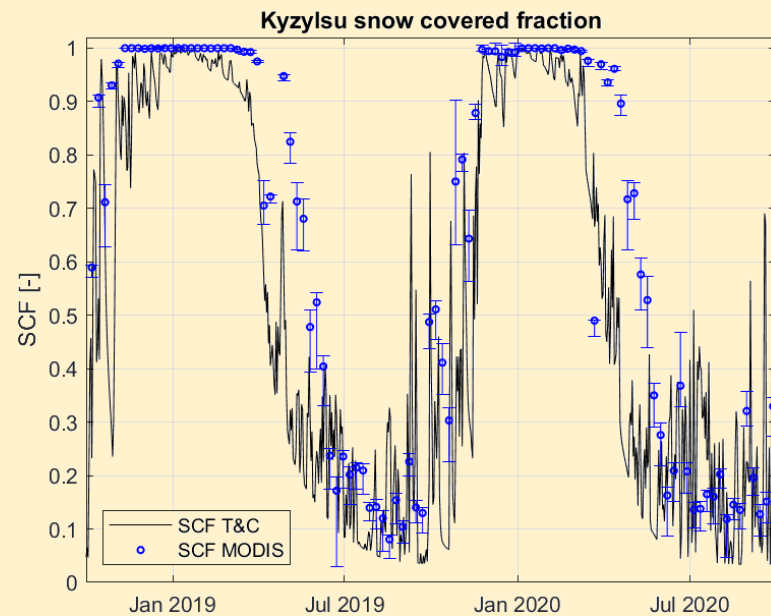


Kyzylsu



24K





Conclusions

- Physically reasonable model outputs in two distinct climates without any tuning
- Downscaled/bias-corrected ERA5-Land suitable for model forcing in Kyzylsu
- Potential for robust modelling in space and time, given physical and dynamic representations of all WB components

more T&C: Pascal Buri and Achille Jouberton (after coffee break)

Thank you!



feel free to reach out: stefan.fugger@wsl.ch