Surface energy balance and sublimation of the winter snow cover at 4863 m a.s.l. on Chhota Shigri Glacier moraine (western Himalaya, India) between 2009 and 2020

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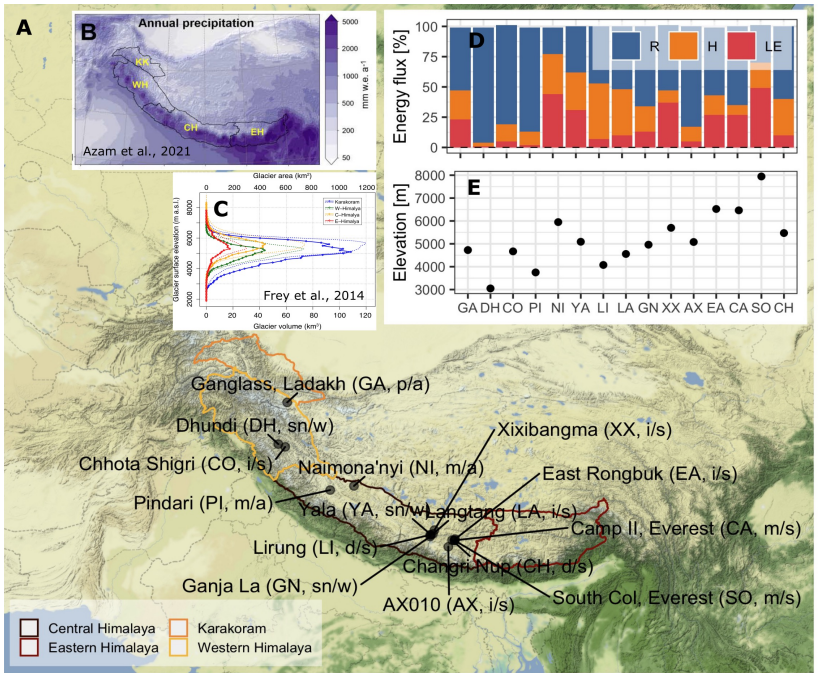
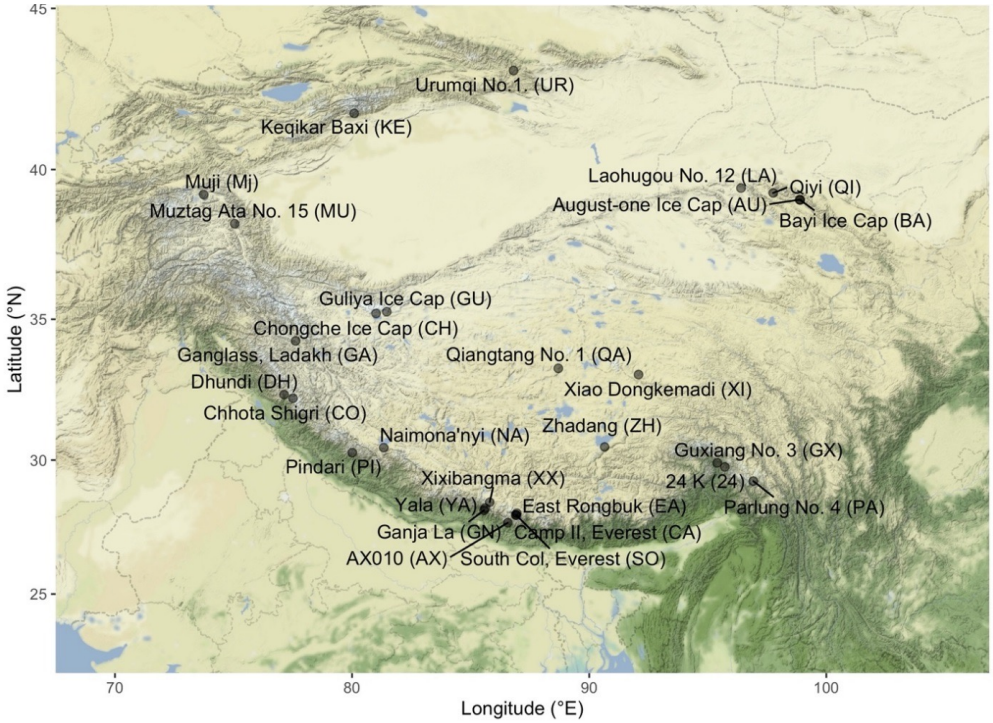
Outstanding Student & PhD candidate Presentation contest

Sublimation is poorly studied in the Himalaya-Karakoram (HK)

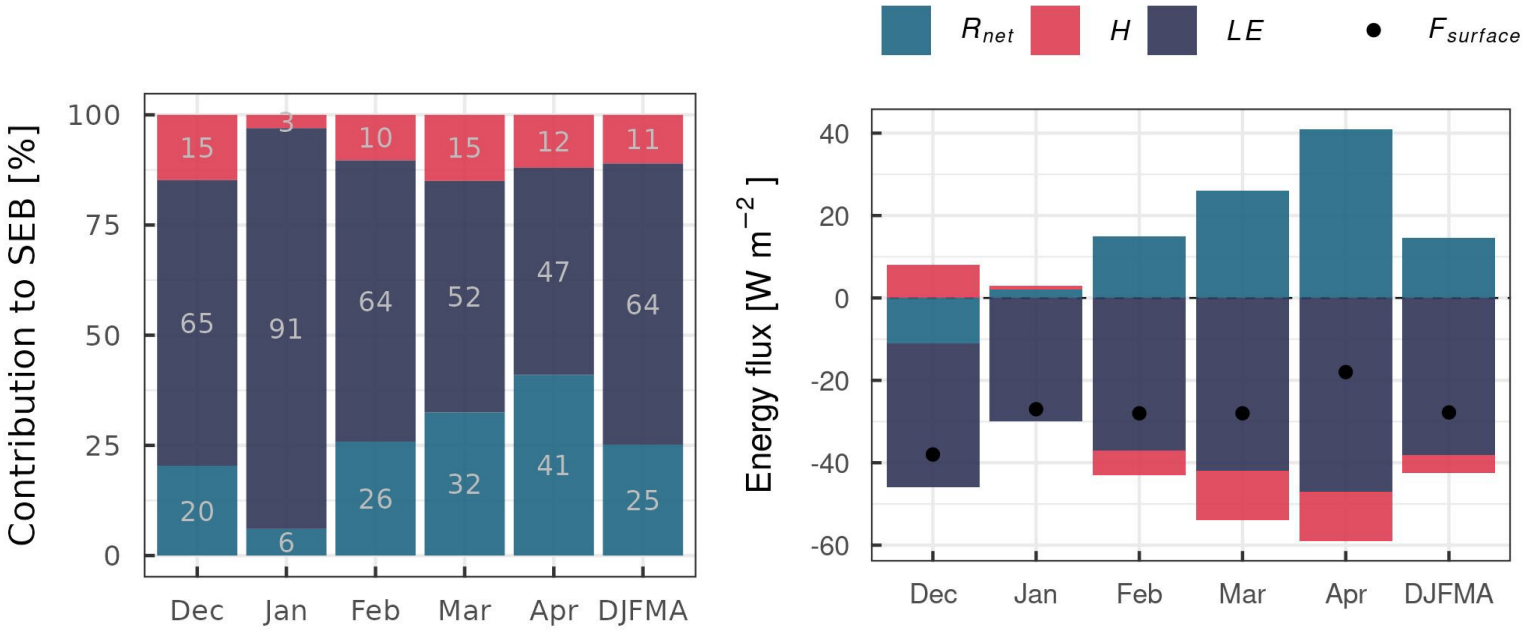
Credit: individual studies





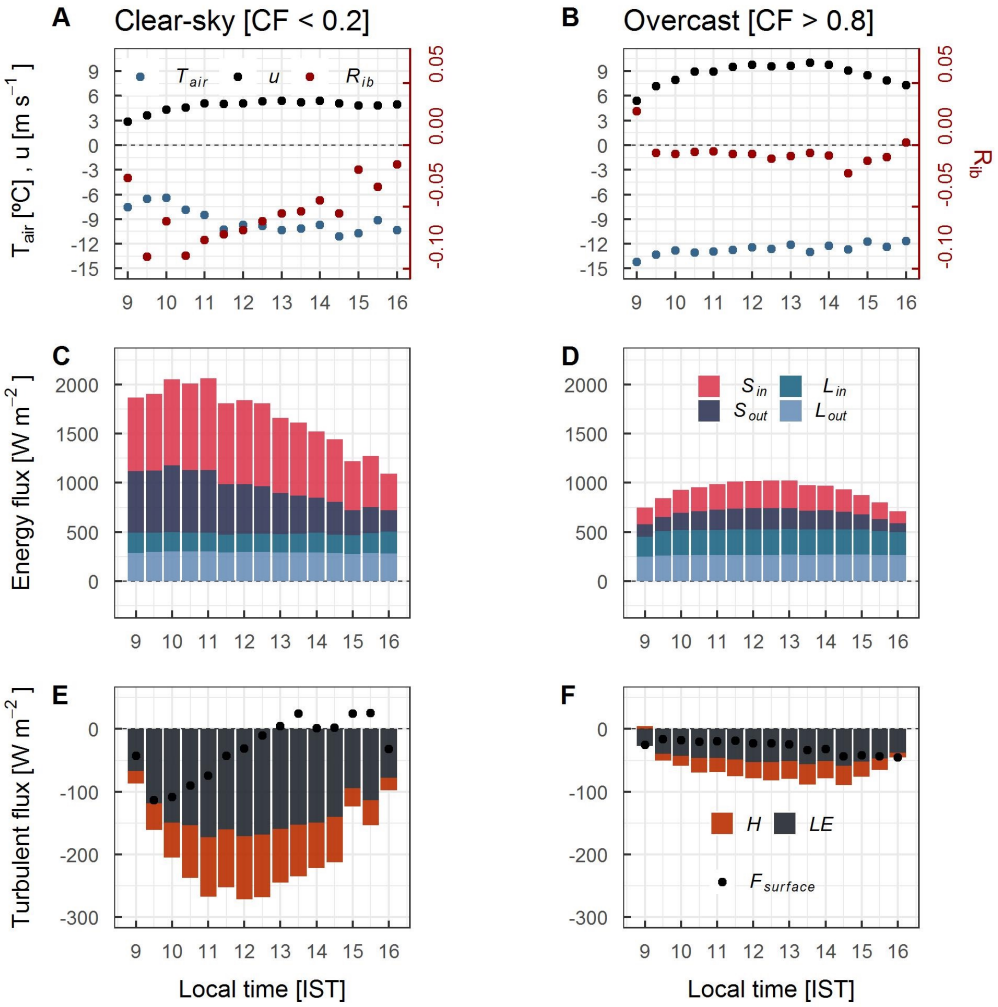
- ~15 sites in HK (<10 on-glacier/snow) and 17 in Tibet
- Most study focused on R_{net}, largest proportion in summer SEB
- Chhota Shigri Glacier ⟶ relatively well-studied glacier in the HK

Latent heat flux contributes > 60% in SEB during DJFMA



- Increasing R_{net} reduce turbulent flux proportion
- LE = ~-40 W m^{-2} equivalent to ~1 mm w.e. sublimation everyday

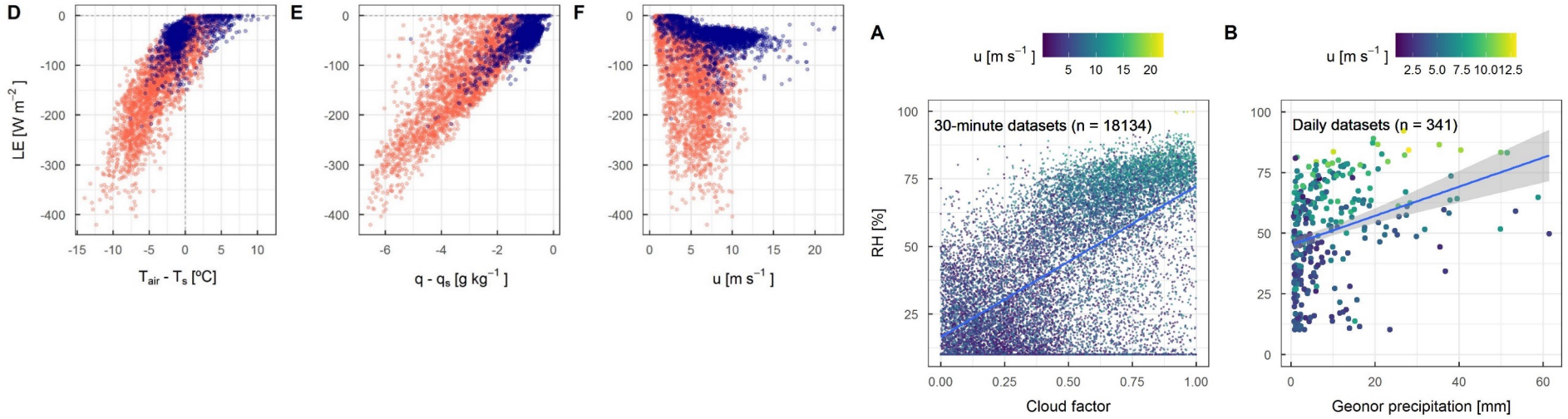
Cloud cover shapes the near-surface meteorology



- ~70% ↓ in S_{in}, ~25% ↑ L_{in} and ~50% decrease in *LE*/*H* magnitude
- Strong wind and low temperature ~= near-neutral boundary conditions
- Overcast = happy snow/glacier😊

Vertical moisture and temperature gradient and wind drives turbulent fluxes

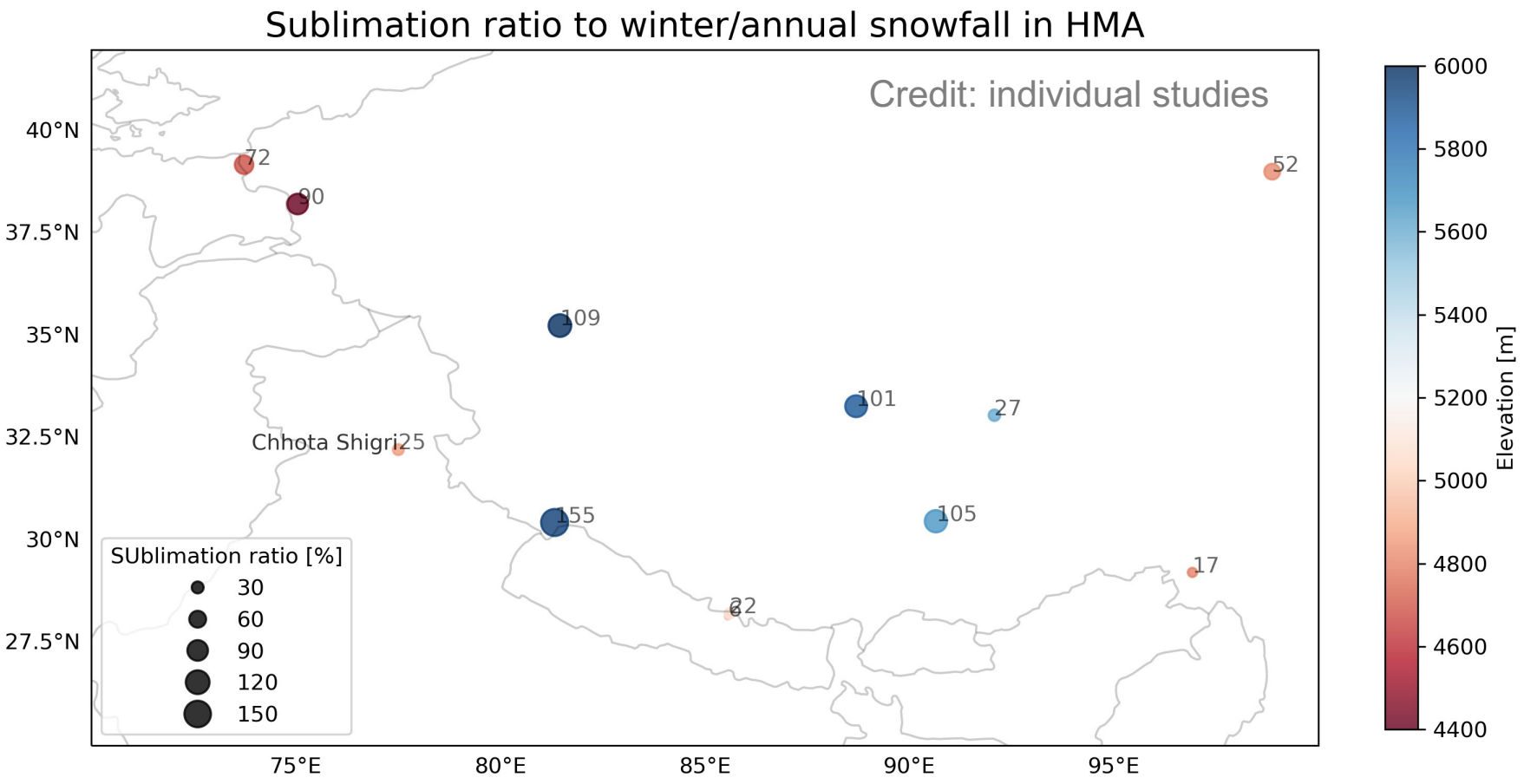
Westerly winds impede sublimation



- Higher near-surface heating and convection ⟶ steeper gradient
- Westerlies bring high moisture, strong wind and low temperature

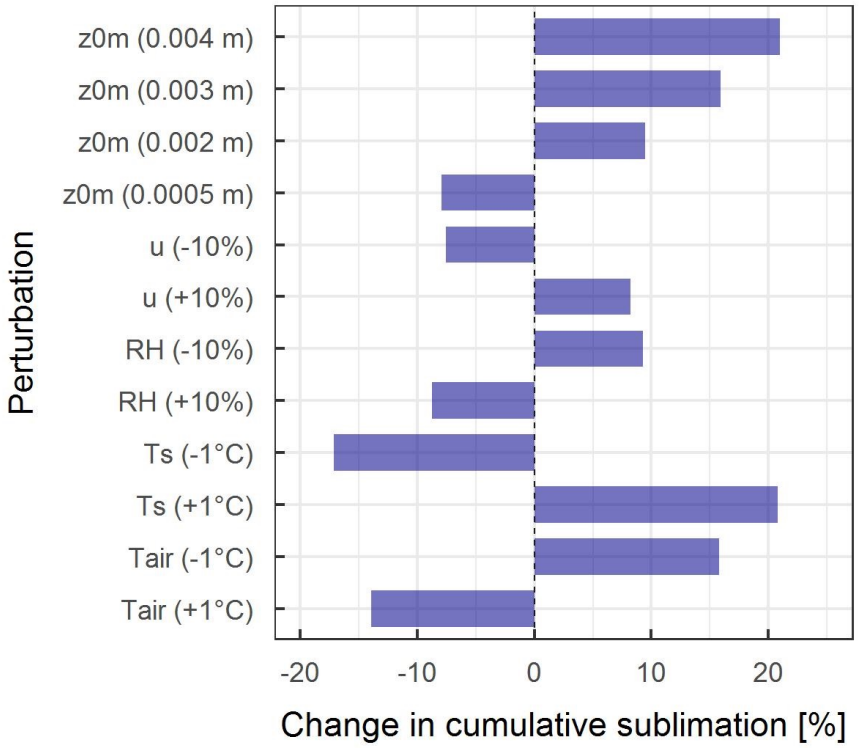
- Sublimation relationship → not simple!!
- Together q - q_s, T_{air} – T_s and wind explains it the best > 90%

At Chhota Shigri sublimation fraction is > 25% of winter snowfall



- Sublimation is an important part
- Especially at higher altitudes-low pressure
- ↑ sublimation in the western HK/HMA, dry-arid!

Increasing T_{air} will reduce sublimation, that means higher melt?



- ↑ T_{air} will reduce the negative vertical temperature gradient → ↓ sublimation
- ↑ T_{air} across 🌍 including HK region
- Considering T_{air} ↑ ~0.3 ± 0.2°C decade^{-1} will ↓ sublimation by ~5%

Thank you very much for your attention

Happy to answer, take suggestion and discussion
Or you can email me: arindan.141@gmail.com

Detailed information of the study, please visit to:
https://tc.copernicus.org/preprints/tc-2021-386/ [preprint]

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My information and research:

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