

Examining Snow Cover Duration on Mt. Baker from 2018 to 2023

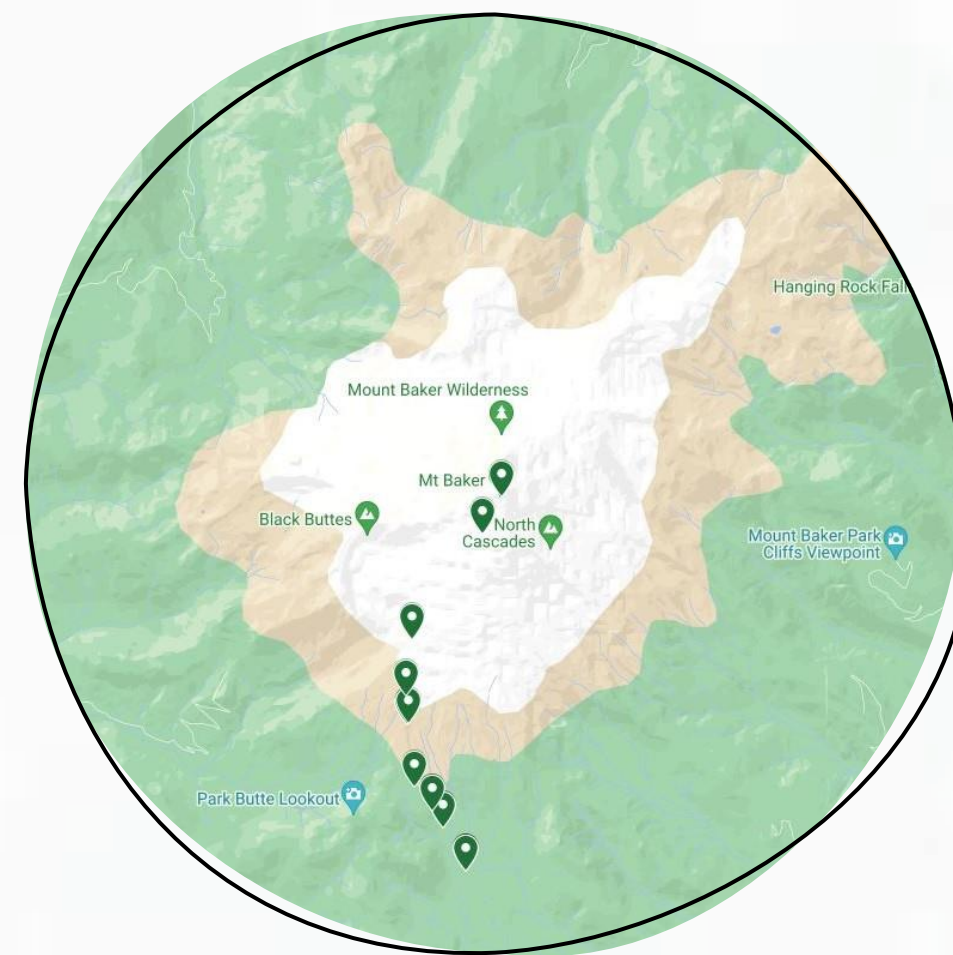
Zara Z.

background

In the Pacific Northwest...

- Snowpack is very likely in decline¹
- Many glaciers are retreating²

And Mt. Baker, one of the most well-known mountains in the Pacific Northwest, is experiencing 2x the warming of the USA³



Map of Mt. Baker & LSRI sensor locations

motivation

These concerning environmental changes pose a threat to water resources, ecosystems, and surrounding communities.

My analysis on Mt. Baker's snow cover seeks to contribute to the efforts in mitigating climate change impacts on vulnerable communities.

method

1. Site and Data Collection

- Data was collected from the south side of Mt. Baker
- Uses 16-21 temperature sensors known as iButtons
- Data spans 5 years, from July 2018 to July 2023.

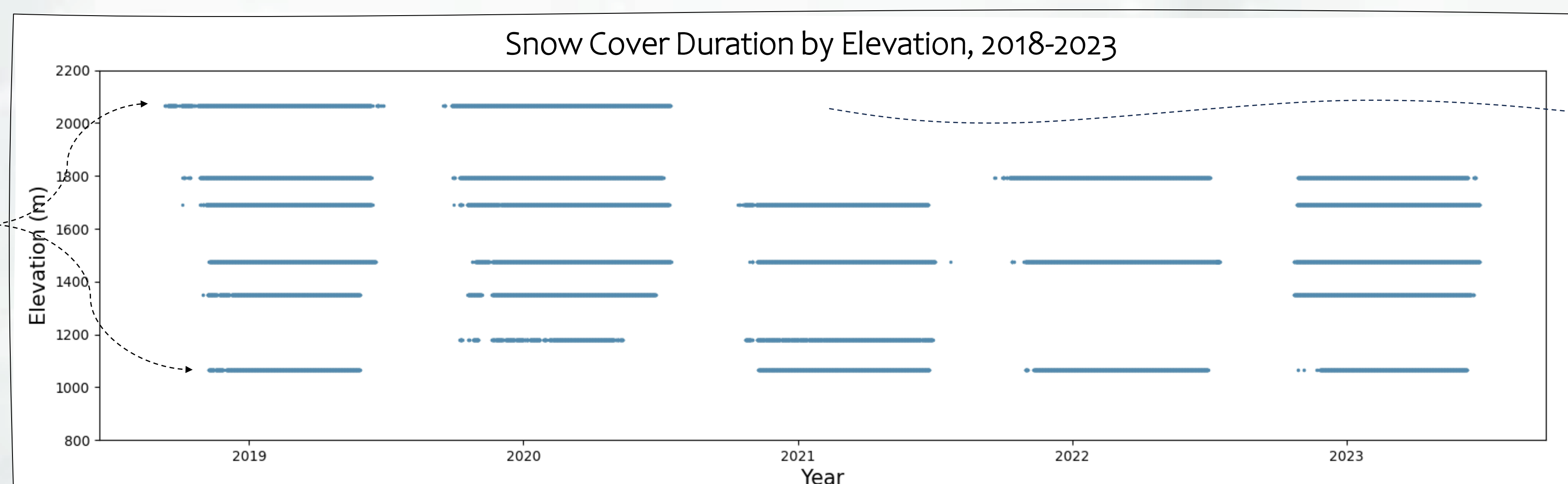
2. Snow Cover Analysis

- Snow cover duration data were obtained from iButtons buried in near-surface soil at various elevations.
- Sensors detect diurnal temperature undulations in the soil – except when there is snow cover, which serves as both an insulator and a reflector (of solar radiation)⁴.
- Snow-covered days can thus be identified by minimal temperature variance and temperatures around 0 °C

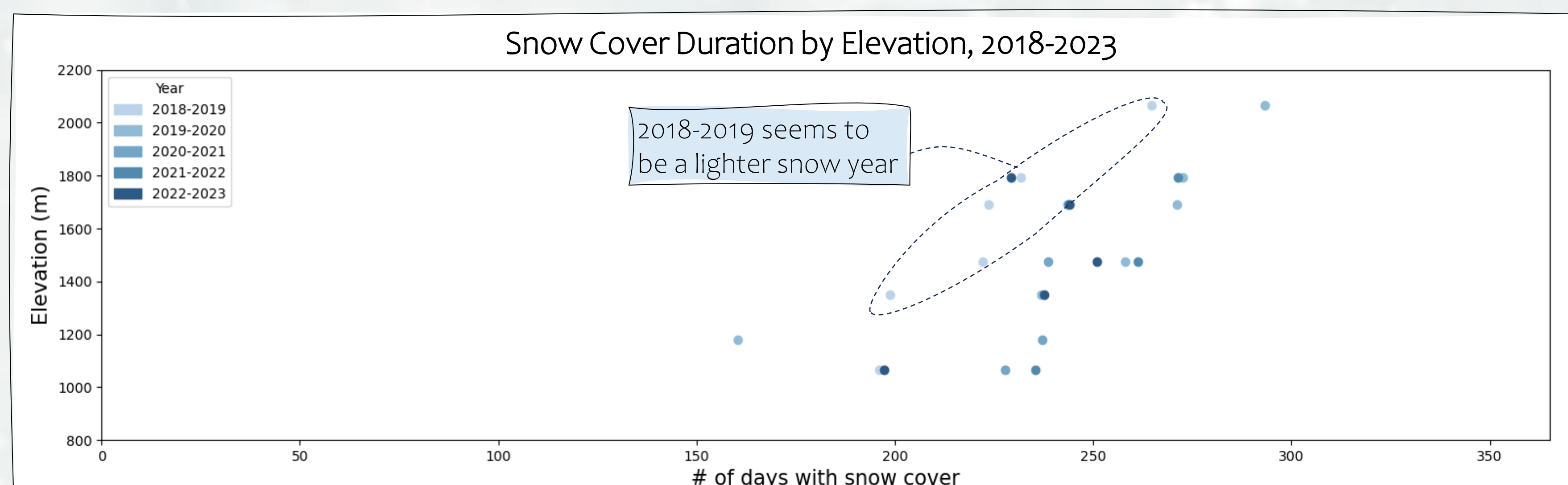
3. Limitations

- The snow cover analysis used in this study accounts for only near-zero temperatures, not temperature variance.
- Thus, the results are likely to be a slight overcount of the true number of snow-covered days, as it would include days without snow cover but with diurnal temperatures near zero.

results



Snow cover duration is longer at higher elevations, which is expected



future work

- Include variance in calculations to more accurately identify the days with snow cover.
- Investigate the snow cover start and end dates from 2018 to 2023
- Compare to other sources of snow cover information such as ERA5 to ensure accuracy

references

- ¹ Siirila-Woodburn et al. Nat Rev Earth Environ 2, 800-819 (2021).
- ² Frans, C., et al. (2018). WRR, 54,6202-6225.
- ³ Gonzalez et al 2018 Environ. Res. Lett. 13 104001
- ⁴ Lundquist, J. D., and F. Lott (2008), Using inexpensive temperature sensors to monitor the duration and heterogeneity of snow-covered areas, *Water Resour.*

acknowledgements

A huge thank you to...

- My Mt. Baker Climate teammates – Felicity, Noah, and Kaiden – with whom a mountain of data munging was done
- Dr. Town and Ms. Howard, who taught us so much already in such a short time
- Lakeside School & Earth and Space Research, for putting together such an awesome opportunity to do research.
- Ballard Data Science, for providing ongoing funding for our sensors