

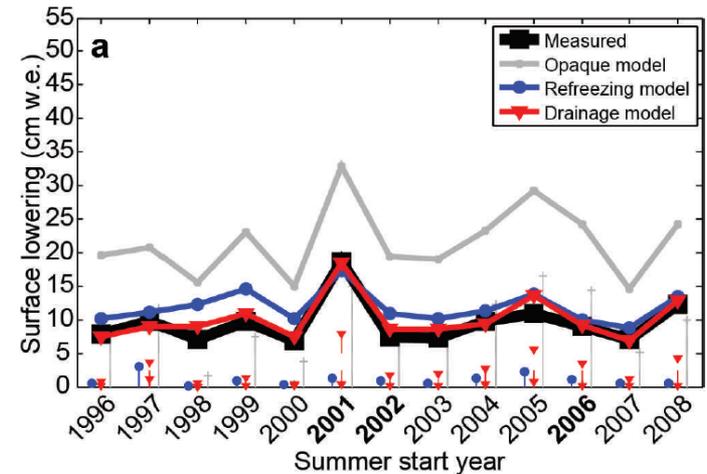
# Mass loss from below-surface melting on Antarctic glaciers

## Objective

Glaciers in the Dry Valleys of Antarctica never rise far above the threshold of melting throughout summer. They are rarely observed to be actively melting, making traditional melt modeling techniques inadequate. Yet runoff from these glaciers is the primary source of water to streams, lakes and associated ecosystems in the valleys.

## Research

- Included penetration of solar radiation into the ice and drainage of subsurface melt out of the ice into a melt model for Antarctic glaciers.
- Subsurface absorption of solar radiation in the upper meter of ice is critical to accurately model melt on these glaciers.
- Including drainage of subsurface melt in the model further improves model predictions of ablation, ice density, and ice temperature.



Including penetration of solar radiation & drainage of subsurface melt greatly improves model predictions of ablation.

## Impact

We show that most melt on these cold glaciers occurs below the surface in the upper 20 cm of ice. Thus, they will respond differently to changes in climate than glaciers in warmer climates. This will also apply to other glaciers at very high latitudes and elevations and on Mars.

**Reference:** M.J. Hoffman, A.G. Fountain, and G.E. Liston. 2014. Near-surface internal melting: a substantial mass loss on Antarctic Dry Valley glaciers. *Journal of Glaciology*, **60**, 220 p 361-374. doi:10.3189/2014JoG13J095.