

Patricia Glatz: Mechanical & Industrial Engineering
Mentor: Ed Adams -- Civil Engineering
Modeling Snow Temperature in Complex Topography

The stability of snow on a mountain slope is largely dependent on particular states of snow layers. This includes the morphologic state of snow cover at the microstructure level, e.g. bonds and grains. Microstructure is largely dependent on the surface temperature and the temperature gradient of snow after its initial formation as atmospheric precipitation. These thermal variations at and near the surface may lead to morphologies such as ice crusts, surface hoar, and near surface recrystallization. [1] To look at this relationship, the first principles energy balance model RadThermRT has been enhanced and implemented to account for the complex nature of the topography of a given slope. From the geographic data and weather input, one dimensional finite difference heat conduction equations are solved normal to the surface of interest, which allows the temperature profile of each facet to be determined. Currently, two slopes in the Yellowstone Club are being modeled with others in progress to see if these weak spots can be pre-casted. To date, surface crystallization can be modeled and seen for days that are known to have crystallization.