

Name:

Date:

## Interactions between Albedo, Snow, and Land Cover

**Introduction.** Albedo is a measure of how much solar energy is reflected from a surface, and therefore has a direct relationship with the climate (the more solar energy reflected, instead of absorbed, the less the climate will warm). The albedo of a surface is influenced by a variety of factors, such as land cover and land use, seasonal changes in vegetation, snow, etc. Knowledge of what is happening on the land surface and how it can influence albedo is critical to understanding the Earth's current climate, and how it might change in the future.

**Guiding research question:** How does albedo change in response to changes in snow depth and land cover?

1. Snow depth is measured across the USA through the Soil Climate Analysis Network (SCAN). Below are pictures of the SCAN stations at two different locations: Hubbard Brook in NH and Glacial Ridge in MN.

Hubbard Brook SCAN Station, NH



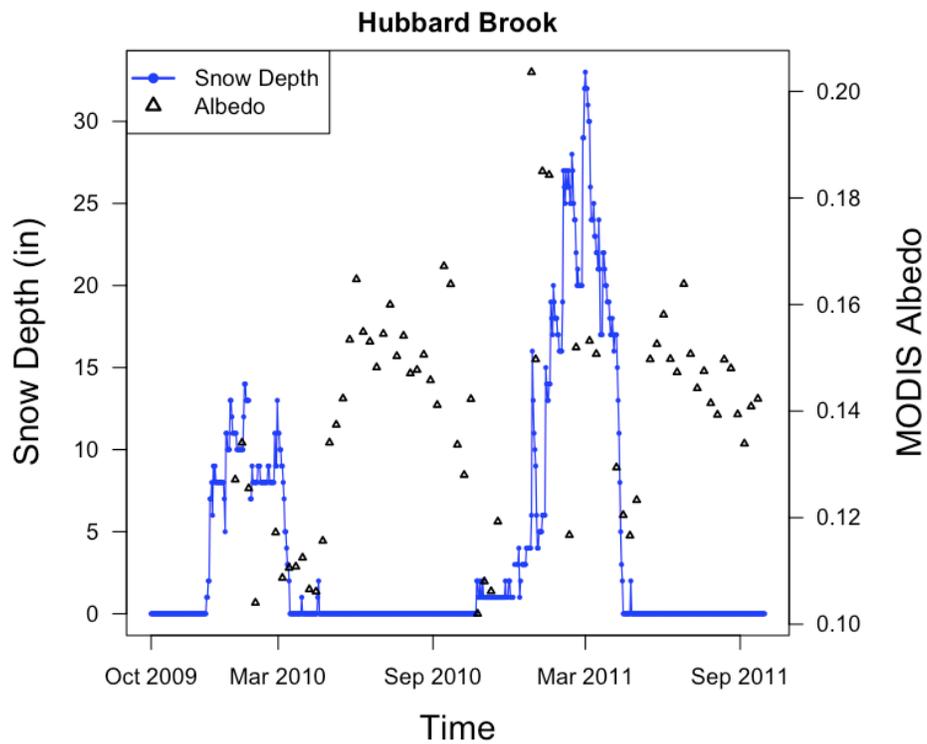
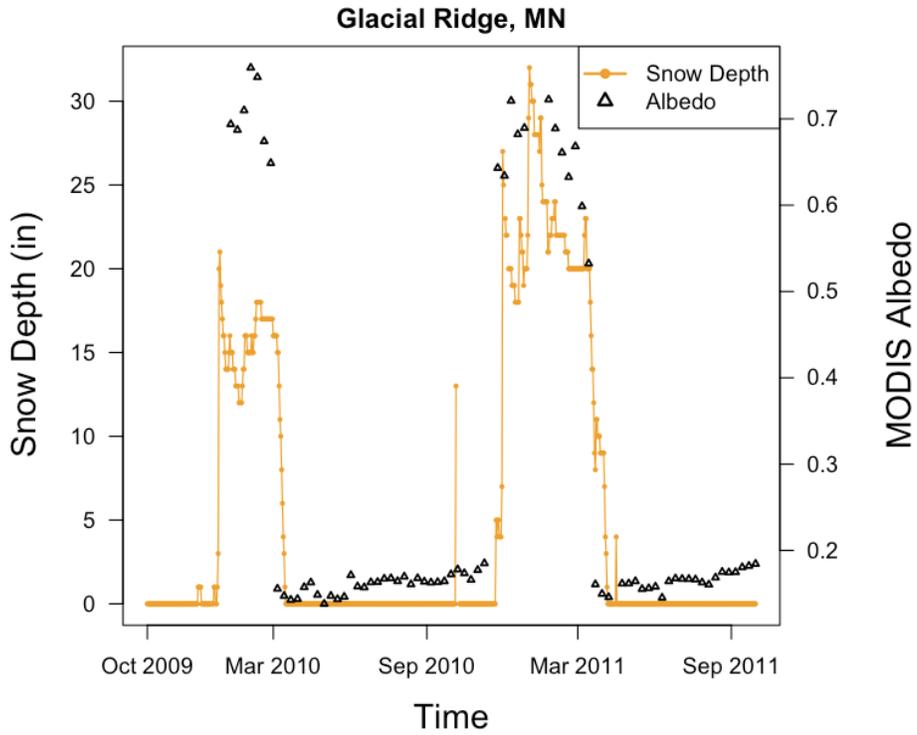
Glacial Ridge SCAN Station, MN



a) What differences do you notice between the two sites?

b) Based on your knowledge of albedo, how do you think the summertime albedo values will differ between the two sites?

2. The graphs on the below show albedo (black triangles) and snow depth (orange or blue line) at the two different sites for October 2009 to September 2011. Use the graphs to answer the questions on the following page.



a) In the Glacial Ridge graph, what is the approximate difference in albedo between the summer and the winter? (*Hint: the albedo values are on the right-hand axis*)

b) What similarities and differences do you notice between 2010 and 2011 at Glacial Ridge?

c) Why do you think the Glacial Ridge albedo for both 2010 and 2011 is relatively consistent even though the snow depths are different?

d) What is the range of albedo values at Hubbard Brook? Is this range similar or different to the albedo range at Glacial Ridge?

e) Give at least one example of how the albedo and snow depth patterns at Hubbard Brook are similar to the patterns at Glacial Ridge and at least one example of how they are different. Explain why you think those similarities and differences exist.

f) Based on the data from these two sites, how does albedo change in response to snow depth and land cover?

g) Develop one new research question that is related to albedo, snow, location, and/or land cover and can be answered using scientific data.