

A. Cody Beedlow
GeoDay Abstract

The Use of Surface Energy Balance Models As a Means to Quantify Changes in Glacier Mass Balance

Alpine glaciers are sensitive to perturbations in climate, and this signal can be seen through the mass balance of a glacier. As a result, glacier mass balance provides an important lineage of advances and retreats of glaciers with changes in climate (Patterson, 1994). Though conceptually simple, the complex nature of a mountainous environment provides many uncertainties with mass-balance measurements, leaving many to question the validity of the data. Such measurements require extensive amounts of time and equipment, making it difficult to collect mass-balance measurements in remote field locations.

To alleviate these uncertainties, modeling glacial dynamics by means of climatic forcing provides an opportunity to model past and future glaciers, as well as simulating mass balance on remote glaciers that would be otherwise logistically impossible to collect data. Such models can supplement field measurements, allowing one to isolate and understand the different parameters that control the advances and retreats of glaciers to a changing climate. Glacier mass balance is highly correlated to the surface energy balance, and we will test this hypothesis by calibrating a surface energy balance model (SEB) by Anslow et al. (2008), to the Collier Glacier on North Sister. Besides its close proximity to Corvallis, the Collier Glacier is a good calibration ground because of the previous mass-balance measurements conducted by Oregon State University 16 years ago, providing a record for model calibration. This SEB model will also be tested and calibrated with mass-balance measurements on the Collier Glacier through the spring and summer of 2009.