Direct observations of lava flowing on top of, against, and within ice are rare because: (a) such eruptions do not occur frequently on a human time-scale, (b) they tend to happen in remote places, and (c) hazards associated with such eruptions can prevent close observations. A new joint project between the Department of Earth Sciences and College of Visual and Performing Arts Sculpture Program at Syracuse University, informally referred to as the ‘Syracuse University Lava Project’, is providing a unique opportunity to gain qualitative and quantitative new insights into lava-ice interactions. The Project provides an experimental framework for melting up to ~400 kg of rock and pouring the molten material in a controlled way onto a variety of surfaces. During Winter 2011, several sets of qualitative and quantitative experiments were conducting by pouring lava on top of and against large sheets of ice (~3 m long, ~1.5 m wide, ~10-20 cm thick). Several lava behaviors observed during the experiments mimic field characteristics of glaciovolcanic lava flows from global geographic locations (British Columbia, Hawaii, Iceland), including the formation of: (1) large bubbles likely resulting from vaporization of water from ice melting beneath the lava (BC), (2) pseudo-pillows at the base of lava flows (Hawaii), and (3) cuspate ice margins mimicking lava lobe boundaries (Iceland). Future experiments will include measurements of ice and snow melting rates, crystallization rates caused by rapid cooling, and growth of pillow lava.
The Kawdy-Tuya volcanic fields in northern British Columbia contain a diverse range of basaltic subaerial and presumably glaciovolcanic deposits, ranging in age from Early to Mid-Pleistocene. Morphological variations range from well-preserved, flat-topped tuyas (e.g. Tuya Butte), to conical/radial edifices (e.g. Ash Mountain), to linear ridges (e.g. Caribou tindar). Degree of erosion also varies significantly, with some features showing evidence for extensive erosion (e.g. Horshoe tuya). Lithofacies variations cover much of the spectrum seen in other locations of extensive glaciovolcanism, including massive pillows lavas, fragmental deposits formed by diverse processes (e.g. explosive and quench), dikes and other small intrusions, and pillow-fed deltas. Some of the lithofacies appear to be relatively unique, including well-sorted, poorly lithified, cross-laminated sand deposits, and radially-jointed lava masses that locally directly overlie pillow lava. The variations in deposits across the volcanic fields likely correlate to the relative thickness of syn-eruption ice cover, the sub-ice hydrology at the time of eruption, and the volume of magma available during eruption onset. The presence of >30 glaciovolcanic features across this relatively limited geographic area, when combined with more traditional evidence of past glaciations (e.g. till, bedrock striations), presents a unique opportunity for constraining paleo-climate conditions over a period of time spanning at least 1 m.y.