Progress of science and remaining challenges within the GLIMS project

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The GLIMS Glacier Database is continually growing, and now includes new detailed maps of glacier outlines in Alaska, Peru, North Patagonia, northern Chilean volcanoes, eastern Greenland, Italian Alps, Sweden, the Caucasus, Tien Shan, Karakorum, Pamir, the Antarctic Peninsula, and Afghanistan. As the database grows, it becomes increasingly useful as the basis for studies of spatial and temporal glacier variability. A change-detection study based on GLIMS data compared recent glacier outlines for the Cordillera Blanca region of Peru to outlines based on 1962 maps. This study documented significant glacier recession in the region over the last 40 years, but also indicated that accurate measurement of area change is complicated by inconsistencies in the way glacier analyses are done. For example, different analysts have treated accumulation zones differently, some including high snow fields as part of the glacier and some not. To address such issues, the U.S. National Snow and Ice Data Center (NSIDC) has initiated an experiment, the GLIMS Analysis Comparison Experiment (GLACE-II), in which each GLIMS participant contributing data to the GLIMS database was asked to produce glacier outlines and various scalar attribute data for a selected glacier in the Canadian Coast Range. Participants were supplied with two images of the selected glacier, one from ASTER in 2000 and one from Landsat ETM+ in 1991. The objective of the experiment was to quantify the uncertainties in the GLIMS database stemming from use of different image classification algorithms, as well as variations in human interpretation. The experiment highlighted the need to take advantage of topographic information in determining glacier outlines. Through the lessons learned from the GLACE tests and through protocol standardization, GLIMS aims to build a more consistent database. Protocols can be standardized in part by implement-

ing recommended tools in GLIMSView, a free multi-platform glacier mapping tool developed within GLIMS.