Information on bed topography and basal conditions is required to develop models that can explain the speed-up of three large glaciers in Greenland and their future behavior in a warming climate. Radar sounding of these glaciers has been a major challenge due to the large attenuation and surface clutter. The large attenuation is caused by warm or temperate ice near the bed and a heavily creased surface, which is typical of fast-flowing glaciers and results in significant off-vertical surface scatter that masks weak ice-bed echoes. We developed high-sensitivity radars with synthetic aperture and cross-track array processing capabilities and successfully used them to sound the glaciers. These radars operate at center frequencies of 150 and 195 MHz with a cross-track array of 6-15 elements. We collected data with a 6-element transmit and a 6-element receiver array during the 2008 and 2009 field seasons. Some of these data were collected as a part of the IPY program and used to generate first and only bed topography maps for these glaciers. First, radar data from each element of the receive array are processed with a Synthetic Aperture Radar (SAR) processor. Second, SAR-processed data are further processed with traditional-array and adaptive-array algorithms to reduce surface clutter and enhance ice-bed echoes. These processed data are used to generate first and only bed maps for these glaciers. We will show bed topography maps and discuss both the design considerations for radars created to sound and image ice sheet margins, including fast-flowing glaciers, and signal processing techniques.