In order to increase the understanding of the changing climate, the European Space Agency has launched the Climate Change Initiative (ESA CCI), a program which joins scientists and space agencies into 13 projects either affecting or affected by the concurrent changes. This work is part of the Ice Sheets CCI and four parameters are to be determined for the Greenland Ice Sheet (GrIS), each resulting in a dataset made available to the public: Surface Elevation Changes (SEC), surface velocities, grounding line locations, and calving front locations. All CCI projects have completed a so-called Round Robin exercise in which the scientific community was asked to provide their best estimate of the sought parameters as well as a feedback sheet describing their work. By inter-comparing and validating the results, obtained from research institutions world-wide, it is possible to develop the most optimal method for determining each parameter. This work describes the SEC Round Robin and the subsequent conclusions leading to the creation of a method for determining GrIS SEC values. The participants used either Envisat radar or ICESat laser altimetry over Jakobshavn Isbræ drainage basin, and the submissions led to inter-comparisons of radar vs. altimetry as well as cross-over vs. repeat-track analyses. Due to the high accuracy of the former and the high spatial resolution of the latter, a method, which combines the two techniques will provide the most accurate SEC estimates. The data supporting the final GrIS analysis stem from the radar altimeters on-board Envisat, ERS-1 and ERS-2. The accuracy of laser data exceeds that of radar altimetry; the Round Robin analysis has, however, proven the latter equally capable of dealing with surface topography thereby making such data applicable in SEC analyses extending all the way from the interior ice sheet to margin regions. This shows good potential for a future inclusion of ESA CryoSat-2 and Sentinel-3 radar data in the analysis, and thus for obtaining reliable SEC estimates throughout the entire GrIS.