

NASA's Operation IceBridge: using instrumented aircraft to bridge the observational gap between ICESat and ICESat-2 laser altimeter measurements

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In 2009, the NASA satellite laser altimeter mission ICESat (Ice, Cloud and Land Elevation Satellite), which was launched in 2003, ceased to operate. To bridge the gap in polar laser observations between ICESat and its replacement ICESat-2, scheduled for launch in 2016, Operation IceBridge was initiated in 2009. From a series of yearly polar flights, Operation IceBridge uses airborne instruments to map rapidly changing areas in the Arctic and Antarctic, building on two decades of repeat airborne and satellite measurements. Combined with previous aircraft observations, as well as ICESat, CryoSat-2 and the forthcoming ICESat-2 observations, Operation IceBridge will produce a cross-calibrated 17-year time series of ice sheet and sea-ice elevation data over Antarctica, as well as a 27-year time series over Greenland. These time series will be a critical resource for predictive models of sea ice and ice sheet behavior. In addition to laser altimetry, Operation IceBridge is using a comprehensive suite of instruments to produce a three-dimensional view of the Arctic and Antarctic ice sheets, ice shelves and the sea ice. The suite includes two NASA laser altimeters, the Airborne Topographic Mapper (ATM) and the Land, Vegetation and Ice Sensor (LVIS); four radar systems from the University of Kansas Center for Remote Sensing of Ice Sheets (CREGIS), a Ku-band radar altimeter, accumulation radar, snow radar and the Multichannel Coherent Radar Depth Sounder (MCoRDS); a Sander Geophysics airborne gravimeter (AIRGrav), a magnetometer and a high-resolution stereographic camera (DMS). Since its start in 2009, Operation IceBridge has deployed 5 geophysical survey aircraft, 16 science instruments, and has flown 1,613 hours during 181 science missions covering over 760,000 flight kilometers. All IceBridge data is freely available from NSIDC (<http://nsidc.org/data/icebridge>) 6 months after completion of a campaign.

Website: <http://www.nasa.gov/icebridge/>