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VALIDATING ICESAT DATA AT LAW DOME, EAST ANTARCTICA WITH KINEMATIC GPS

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In-situ validation of the performance of altimeters is important for understanding instrument capabilities, performance, limitations and biases. Previous cal-val activities for ICESat (Magruder et al. 2005, Fricker et al. 2005 and Martin et al. 2005) were conducted either outside the polar regions or not over the ice sheet. Here we present results of a cal-val activity conducted near the summit of Law Dome, East Antarctica, where surface slopes are less than 10 m/km. In Nov 2004, we performed a Hagglunds-based kinematic GPS survey beneath an ICESat orbital crossover. We installed two “fixed” GPS receivers under the ascending ICESat track: one at the crossover, the other 4 km to the north-east. This doubled the available double-difference observations for the kinematic survey, thereby increasing the accuracy of the kinematic GPS solution. Kinematic GPS profiles were surveyed along both the ascending and descending ICESat tracks, which were augmented by perimeter and “fill-in” tracks allowing a 5m-by-5m Digital Elevation Model (DEM) to be constructed. The DEM was then interpolated to the 36 geolocated ICESat footprint locations on each track. Preliminary results for differences between ICESat and GPS elevations are (mean ± standard deviation): Laser 2a -2.4cm ± 8cm, Laser 2b 9.4cm ± 6.6 cm, Laser 2c 2cm ± 8cm, Laser 3a and 3b cloud, Laser 3c 10.0cm ± 5.5 cm, Laser 3d 16.0cm ± 6.4cm. These results demonstrate the high accuracy and precision of ICESat. Biases between the operation periods are most likely a result of pointing errors which will be removed during subsequent ICESat data reprocessing. The detected height differences are being investigated as the study area is known to be in positive balance.