

## The NASA Ice, Cloud and land Elevation Satellite (ICESat) Series: Science, Data Products and Operations

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The first satellite in the ICESat series, known as ICESat-1, was launched on a Delta-2 rocket in January 2003 from Vandenberg AFB carrying a laser altimeter, known as the Geoscience Laser Altimeter System (GLAS). The orbit was near-circular with an altitude of approximately 600 km with an inclination of  $94^\circ$ . After nearly two billion laser shots during 18 data collection campaigns, ICESat-1 was intentionally deorbited in 2009. The next satellite in the series, known as ICESat-2, will carry the Advanced Topographic Laser Altimeter System (ATLAS), and it is planned to be launched on a Delta-2 rocket in October, 2017 (also from Vandenberg AFB) into a near-circular altitude of approximately 500 km and an inclination of  $92^\circ$ . As evident from the preceding orbit parameters, there are some similarities and differences in the satellite series. Whereas the ICESat-1 altimeter used a near infrared laser with a single beam operating at 40 Hz and digitized the full returned waveform, ICESat-2 will operate with a green laser with a much higher repetition rate of 10 kHz. and six beams using a photon-counting detection strategy. As with ICESat-1, ICESat-2 will use ground-based laser ranging (SLR) to validate the positioning derived from GPS measurements. Furthermore, concern exists with ICESat-2 (as was the case for ICESat-1) with illumination of the spaceborne detectors by the ground-based lasers and constraints will be imposed on the SLR operation to protect the spaceborne detectors. This presentation will summarize the science objectives, the data products and the planned operational requirements and constraints for ICESat-1 and ICESat-2.