

Taku Glacier, Alaska in 2018 Highest Snowline in 70+ Years

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ABSTRACT

The Juneau Icefield Research Program (JIRP) has been examining the glaciers of the Juneau Icefield since 1946. The height of the transient snowline (TSL) at the end of the summer represents the annual equilibrium line altitude (ELA) for the glacier, where ablation equals accumulation. Until the NASA Landsat program began, field measurements and aerial observations were the only means to observe the ELA. On Taku Glacier the ELA has been observed annually from 1946-2018. The mean ELA has risen 85 m from the 1946–1985 period to the 1986–2018 period. Mean annual mass balance from 1946-1985 and 1986-2018, with 2018 values being preliminary, were $+0.40 \text{ m a}^{-1}$ and -0.18 m a^{-1} , respectively, indicative of the snow line rise resulting in cessation of the long-term thickening of the glacier.

In 2018, TSL on July 5 was 900 m, on July 21 was 975 m, on July 30 was 1075 m, on Sept. 16 was 1400 m, and on October 1 was 1425 m. This is the first time since 1946 that the snowline has reached or exceeded 1400 m on Taku Glacier. The 500 m rise from July 5 to Sept 16th occurred in ~73 days. With a balance gradient of $\sim 3.3 \text{ mm m}^{-1}$ this represents ablation of 1.65 m w.e. snow. On July 22, a snowpit was completed at 1405 m with 0.93 m w.e, that had lost all snowcover by Sept. 16. This is one of seven snow pits completed in July providing field data to verify ablation rate.

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