



Rapid Retreat of the Glacier Bay Ice Stream from the Last Glacial Maximum of the Cordilleran Ice Sheet, SE Alaska

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During the Last Glacial Maximum the maximum extent and dynamics of the Cordilleran Ice Sheet is poorly constrained for coastal Alaska. Here, evidence is presented showing that the Glacier Bay Ice Stream of the Alaskan Cordilleran Ice Sheet extended across the continental shelf of SE Alaska eroding the Yakobi Sea Valley and building a morainal bank at its seaward end. It was feeding sediment down the slope via gullies and major channels to the Chicagof Fan in the Gulf of Alaska. Based on seismic reflection evidence, the ice stream retreated rapidly from the sea valley and concomitant glacial rebound brought the morainal bank at the sea valley mouth into wave base, which transported sediment shoreward into Yakobi Sea Valley. The Glacier Bay Ice Stream terminus then stabilized at the entrance of Cross Sound and remained long enough to deposit a substantial morainal bank and bank-front fan, and partly filled Yakobi Sea Valley with about 7×10^{10} cu m of sediment. Given sediment yield estimates for the region, that volume could easily have been deposited in less than 1 ky. During that period, glacial ice was reduced from an ice sheet to a valley glacier within Lisianski Inlet, a tributary to Cross Sound, after which the ice stream terminus oscillated within the Sound. The ice stream retreat from Yakobi Sea Valley started while coastal upwelling and biosiliceous productivity were strong during the Bølling–Allerød as documented in the EW0408-66JC core (Barron et al., 2009). Warm waters may well have been integral in driving the retreat. The Glacier Bay Ice Stream then continued its retreat from the mouth of Cross Sound at about 12 ka and based on marine deposits preserved at the head of the Glacier Bay, it had vacated the Bay by about 11 ka and the Bay probably had a configuration much like it has today. This was a rapid retreat, being at an average rate of more than 200 m/a over ca. 200 km from the entrance of Cross Sound to the head of Glacier Bay in 1 ky or less. This stage of retreat appears to have continued during the Younger Dryas when declining productivity and an increase in sea ice-related diatoms in Yakobi Sea Valley are taken to indicate cooler, less productive waters on the continental shelf (Barron et al., 2009). Thus changes in mass accumulation or in bed conditions may be more likely drivers of this retreat phase of the Glacier Bay Ice Stream.