Core-seismic study on the pre-glacial history of the Surveyor Fan deep-sea sedimentary system, Gulf of Alaska

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Previous studies show that the Plio-Pliestocene transition (PPT), a glacial intensification in the Northern Hemisphere at ~ 2.7 Ma, marks the genesis of the Surveyor Fan and Channel system in the northern Gulf of Alaska. Since that time, glacially eroded sediment from the St. Elias Mountains have dominated the evolution of this system. However, many questions remain about the provenance of sediment and the nature of sediment delivery to the deepwater prior to the evolution of the Channel system. Integrated Ocean Drilling Program (IODP) Exp. 341 provided sedimentary cores dated as old as ~10 Ma. In this study, we use available 2D seismic data combined with the Exp. 341 core and log data to analyse the depositional environment preceeding and leading up to the PPT. The cores provide lithostratigraphy and an age model of sediment deposition, while seismic data allows us to extend interpretation across the Gulf of Alaska to identify broader depositional patterns associated with the evolving sedimentary of this source to sink system.

We observe a high amplitude reflector package in seismic data just below the ~2.7 Ma horizon that can be mapped across the Gulf. This high amplitude reflector package could be the result of changing depositional style from fluvial to glacial, or an increase in density from a rapid increase in sediment flux to the fan at ~2.7 Ma. We will create a two-way travel time thickness (isopach) map to determine the depositional pattern of this package. Additionally, we will combine the seismic and core data down to the basement (Pacific Plate igneous crust) to show the evolution of the depositional source and delivery system as the Gulf of Alaska coastal mountain ranges transition from a fluvial to Alpine glacial eroder. This study will highlight the significant role of glacial intensification event in building the Surveyor Fan and Channel system and decipher the depositional environment of fluvial sediment delivery that existed for millions of years prior to the modern glacially dominant style.