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Investigator Information
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Funding agency or institution:
University of Alaska Fairbanks

National Program: (if applicable)
NA. Pilot study.

Collaborators:
Sarah Fowell, UAF Geology

Project summary:
My overarching goal is to develop quantitative tracers of flow across the Bering Strait. The Bering Strait is thought to be an important ocean gateway that modulates climate on glacial-interglacial as well as millennial timescales. One potential tracer of this flow is Yukon River sediment. Today, Yukon material is transported north to the Arctic across the strait. However, sometime in the early-middle Holocene, the majority of Yukon River sediment was routed differently. Two USGS vibracores from Norton Sound capture a Holocene history of Yukon River flow and the important timing of arrival of Yukon sediment to Norton Sound. I plan to develop better age control (^{14}C) on these cores and identify changes in sediment source (bulk mineralogy, Nd and Ar isotopes) through time. Pollen analyses may also be conducted to examine the vegetation succession in the Yukon basin. I also target another vibracore site north of St. Lawrence Island. This core is located in a submarine depression and captures inundation of the Strait. I wish to determine the timing (^{14}C) of the terrestrial-marine transition observed in the core as this will provide unique insight into the timing of the opening of the Bering Strait. All other estimates of flooding are from more distal sites.

Potential impacts, major products, and timelines:
Norton Sound cores: Developing a Bering Strait flow tracer is important for testing unverified climate model-driven hypotheses suggesting that flow, and flow reversals across the Bering Strait help to modulate and suppress climate variability in the Holocene. The rocks eroded by the Yukon River are geochemically distinctive from any other Arctic sediment source and thus makes the Yukon an important key to testing this flow reversal hypothesis. Additionally, there is no continuous record of Yukon River discharge for the Holocene, North America's 4th largest river. Thus, it will be a considerable advance to provide information about Holocene Yukon

discharge and when its effluence was first directed towards the Bering Strait and Arctic. I expect these results could be published in a peer-reviewed journal. However, to develop the most complete history, I hope to use the preliminary data I gather into a full proposal for NSF, etc.
St. Lawrence Island core: Although there are several estimates for the timing of Bering Strait flooding, none come from such an ideally located site. It will serve to provide additional constraints on the timing of submergence. This also has the potential to be published but might become a stronger body of work with more sufficient funds.

List of Requested Material from the Repository:
Very little has been done on these cores (pers. comm.; Hans Nelson, USGS lead on sampling expeditions for these OCSEAP cores). Thus, I want to log the cores myself and then determine the precise sampling depths.

Norton Sound Core, S-9-78-BS, 24-24GEO, 494 cm; S-9-78-BS, 22-2GEO, 514 cm.
I request to collect approximately 50 20cc samples, or 1 sample per 10 cm from each core. I also request to put these cores through the GEOTEK core logger to develop high-resolution data non-destructively.

St. Lawrence Island Core, L-7-80-BS, 35-035, 173 cm.
I request to collect approximately 20 20cc samples, focusing on the terrestrial-marine transition. I also request to put this core through the GEOTEK core logger to develop high-resolution data non-destructively.