



Minority University Research and Education Project (MUREP)

Institution: Alaska Pacific University

Award Name: MUREP Institutional Research Opportunity (MIRO) - Group 8

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Title: Alaska Pacific University Microplastics Research and Education Center

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Summary: We are assembling an international research and educational center on the planetary impacts of microplastic proliferation in the Arctic and Subarctic regions, a fragile and diverse ecosystem highly vulnerable to the destructive impacts of this contaminant. NASA's Earth Observatory website describes satellite tracking and mapping of marine microplastics, indicating that microplastic pollution and transport are strategically important to scientists working with NASA's Directorate of Earth Science Division. The warming climate in the Arctic and Subarctic regions makes these ecosystems particularly vulnerable to microplastic pollution. Ocean and river currents bring these contaminants to the north, accumulating in the seabed and ice. They also bioaccumulate in the food chain, impacting fisheries, the fishery economy, subsistence livelihoods, and the health of the animal and human populations who live on these lands.

Our goals align with NASA's Science Mission Directorate of Earth Science Division (ESD) to ""help us to understand our planet's interconnected systems from the global scale down to minute processes."" Yet, up to this writing, there has been no consistent methodology across microplastic studies to achieve a coherent picture of what is occurring in the Arctic. This project invites Alaskan students to collaborate with scientists at a NASA center to learn firsthand the ""myriad connections between our planet's vital processes and the effects of ongoing natural and human-caused changes,"" as the ESD describes, using NASA's satellite data correlated with microplastics data they obtain from their fieldwork. We will follow the recommendations of the California Water Board (CWB), the only state-wide agency in the US, to set up a methodology for monitoring and mitigating the impacts of microplastics in water systems.

What we will do:

- Purchase a Fourier Transform-Infra-Red (FT-IR) spectrometer with an IR microscope of sufficient resolution to identify small (<50 microns) microplastics, following the instrumentation recommendations of the CWB.
- Train faculty and hire and train research assistants on the instrumentation and appropriate collection and testing procedures with the support of the Moore Institute of Plastic Pollution in California (accreditation by the CWB in progress)

- Construct an inquiry-based microplastics lab into the APU "Tumyaraa: The Path Bridging Program," which brings rural Alaska Native high school students to APU for writing and math intensives and college readiness and a foundation in science.
- Include microplastic labs in first- and second-year chemistry courses, giving students hands-on opportunities to collect and analyze microplastics from various sources. Students will be taken on extended field trips to remote locations in Alaska's Arctic and Subarctic regions, from which they will collect samples (surface and ground freshwater, ocean water, snow, and ice) for microplastic testing and analysis.
- MIRO funds will be used to update the chemistry lab equipment, such as scales, glassware, and vacuum pumps. The curriculum will be developed to fulfill the university mission to "indigenize" our chemistry courses, taking a "One Health" approach, assisted by cultural curriculum specialists.
- Initiate collaborations with field scientists at the University of Alaska, Fairbanks (UAF), and the Alaska Space Grant Program at UAF to further microplastics research with a NASA Mission Directorate in Earth Sciences and satellite facilities. For example, we will attempt to use the microplastic data generated from NASA's Cyclone Global Navigation Satellite System or similar satellite system to find correlations with microplastic depositions in coastal regions in Alaska.