AleutBio Expedition (SO293): Exploring Deep-Sea Biodiversity in the Aleutian Trench

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The AleutBio expedition (Aleutian Trench Biodiversity Studies, SO293) was conducted from 24 July to 6 September 2022 aboard the research vessel SONNE to the northeastern Pacific, Bering Sea, and Aleutian Trench. One of its objectives was to evaluate shifts in species composition across the North Pacific, Bering Sea, and Arctic Ocean under accelerating climate change.

A total of 24,587 km² was surveyed with a multibeam echosounder, and 1,765 samples were collected from 15 areas (952 instrument deployments), yielding 5,247 inventory records. From depths of 3,498–7,254 m, 55,691 organisms were sorted, including at least 60 potential new species. A specimen of *Bathyopsurus* n. sp.—the largest recorded munnopsid isopod—was recovered. Of 5,342 peracarid crustaceans sampled, isopods (1,948) were most abundant, followed by amphipods (1,936), tanaidaceans (606), cumaceans (600), and mysidaceans (252).

AleutBio explores mechanisms structuring deep-sea peracarid diversity, focusing on how spatial separation, biogeographic barriers, and restricted dispersal shape community

patterns. Investigations of abyssal and hadal isopod assemblages in the North Pacific seek to clarify how topographic and hydrographic discontinuities influence species distributions.

Contributing to the UN Decade of Ocean Science, AleutBio improves understanding of biodiversity, ecological connectivity, and resilience in deep-sea ecosystems. Its integrative framework—combining genetics, morphology, and environmental modelling—uncovers hidden diversity and supports sustainable management of vulnerable habitats, providing insights into how deep-sea organisms respond to accelerating environmental change.

Novel biogeographic patterns reveal species distributions refining our understanding of dispersal barriers and connectivity between the Pacific, Bering Sea, and Arctic Ocean. Dispersal in amphipods, isopods, and other peracarids is mainly restricted to adult movement, shaping genetic structure and population connectivity. Several discoveries, reported in a recently published AleutBio Special Issue, highlight broad geographic and bathymetric connectivity, sometimes spanning oceanic trenches.