ASGARD: Arctic Shelf Growth, Advection, Respiration and Deposition Rate Experiments

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Summary of Proposed Work: In recent years, our understanding of the composition and structure of the Chukchi ecosystem has exploded, yet our knowledge outside of summer and fall months and year-round of the rates at which fundamental processes operate remains sorely lacking. We propose a pair of springtime cruises to the northern Bering and southern Chukchi seas in 2017 and 2018 at poorly-sampled locations and times of year to conduct a closely integrated set of multi-disciplinary process studies. These will reveal new insights about the transfer and fate of organic carbon in this highly productive and strongly advective region. The Arctic Shelf Growth, Advection, Respiration and Deposition (ASGARD) experiments are designed to quantify: the physical and chemical environments; planktonic and benthic microbial and infaunal communities (composition, abundance and biomass); water mass, heat, salt, nutrient, and particulate advection rates; phytoplankton growth rates; zooplankton growth, reproduction, feeding and respiration rates; quantity, quality, and degradation rates of sediment organic material; benthic respiration rates; and particle sinking and deposition rates. Year-round biophysical and biogeochemical moorings will provide temporal context of select parameters at sites along the primary advective pathways and within multiple water masses and biogeographical regimes.

By focusing on physical and biological rate measurements we will be better equipped to anticipate, understand, and prepare for the ecosystem ramifications of an Arctic experiencing fewer days of ice cover and an accelerated ice retreat. By expanding our boundaries of knowledge and understanding, our work will directly improve the Arctic management and policy decisions that require guidance as we approach the coming decades.