Island mass effect: microzooplankton

Website: https://www.bco-dmo.org/dataset/991030
Version: 1
Version Date: 2026-01-06

Project
» Island mass effects on planktonic communities in the open ocean (Island Mass Effect)

Contributors	Affiliation	Role
Karp-Boss, Lee	University of Maine	Principal Investigator
Bourdin, Guillaume	University of Maine	Scientist
Kristan, Nathaniel	University of Maine	Student

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Coverage

Spatial Extent: **Lat**:0 **Lon**:0

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Parameters

Parameters for this dataset have not yet been identified

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Project Information

Island mass effects on planktonic communities in the open ocean (Island Mass Effect)

Website: https://oceans.taraexpeditions.org/en/m/about-tara/les-expeditions/tara-pacific/

Coverage: South Pacific

NSF Award Abstract:

This study is using existing data to characterize the Island Mass Effect (IME) at 20 locations across the Pacific Ocean. The Island Mass Effect occurs when islands and atolls alter atmospheric and oceanic circulation, resulting in local enrichment of surface waters with nutrients. Local fertilization, in turn, promotes phytoplankton blooms and high plankton biomass that can be advected into the surrounding open ocean and enhance regions of low nutrient availability and low plankton biomass. The Island Mass Effect (IME) is thought to be sufficiently important to affect regional fisheries and biogeochemical processes, but most of our current understanding of this phenomenon comes from satellite remote sensing observations of elevated chlorophyll concentrations that serve as a proxy for phytoplankton biomass. This project entails a systematic, basin-scale evaluation of changes in phytoplankton and zooplankton biomass and composition along environmental gradients from the lagoons and coastal water of islands into the open ocean. The study is making use of a large dataset collected during the TARA Pacific expedition (2016-2018), and results are providing new

information about marine ecological responses to IME and the plankton inventories needed to improve ecosystem models for under sampled regions of the world’s oceans. In addition to supporting graduate and undergraduate students, this project offers a training workshop for early career scientists on best practices for the collection and processing of ship-based underway data.

Islands in the oligotrophic gyres of the Pacific Oceans alter oceanic and atmospheric circulation and provide sources of fertilization to promote local phytoplankton blooms. This so-called Island Mass Effect (IME) is a ubiquitous phenomenon in the Pacific Ocean where vast areas are known to be limited by the availability of macro- and micro-nutrients, yet it is mostly understood from satellite remote sensing observations of elevated chlorophyll concentrations. Beyond remote sensing of chlorophyll, concurrent changes in plankton community composition and structure have been examined for only a small number of islands, limiting our understanding of the biological responses to IME. In this project, the investigators are examining the IME at 20 locations by evaluating phytoplankton community composition, mesozooplankton biomass, and plankton diversity. The investigators are making use of a comprehensive data set collected during the TARA Pacific expedition (2016-2018) that includes: environmental measurements (temperature, salinity, nutrients and trace metals), plankton samples (flow cytometry, plankton imaging, pigments, and genomics), high resolution measurements of optical properties from which biogeochemical proxies are derived, satellite remote sensing data (chlorophyll, temperature, sea surface height), and currents from an ocean circulation model (Mercator Oceans).

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2025402

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