

IR Working Group: Ecological Connectivity and Resilience

Chairs: Anna Metaxas (Dalhousie University, Canada) and Lauren Mullineaux (Woods Hole Oceanographic Institution, USA)

Steering committee: Stephane Hourdez (Station Biologique de Roscoff, France), Andreas Thurnherr (Lamont-Doherty Earth Observatory, USA), Hiromi Watanabe (JAMSTEC, Japan), Yong-Jin Won (Ewha Womens University, Korea)

Other members (have expressed interest to date following a coordinating meeting at the 5th International Symposium on Chemosynthesis-Based Ecosystems): Shawn Arellano (Western Washington University, USA), Chuck Fisher (Pennsylvania State University, USA), Breea Govenar (Rhode Island College, USA), Ana Hilario (University of Aveiro, Portugal), Lisa Levin (Scripps Institute of Oceanography, USA), Steffan Sievert (Woods Hole Oceanographic Institution, USA), Andrew Thurber (Oregon State University, USA), Verena Tunnicliffe (University of Victoria, Canada)

Motivation

The ecological connectivity of vent communities, and their resilience in the face of disturbance, has been a hot topic of research ever since their discovery. Of late, this topic has become particularly timely and societally relevant as plans for deep-sea mining progress toward implementation. It is also directly relevant to management decisions under consideration for recently designated deep Marine Protected Areas (MPAs), such as those on the Endeavour Segment, in the Marianas region, on the mid-Atlantic Ridge off the Azores, and in the Guaymas Basin and Eastern Pacific Rise. These topics were also identified in InterRidge's third decadal plan.

Objectives

We propose to form an InterRidge Working Group with two main objectives:

- 1) Generate a synthesis of scientific data on vent community connectivity. To ensure the research evidence meets the needs of potential stakeholders, we will engage organizations who are tasked with advising, managing and conducting activities related to seafloor mining and MPAs. Specifically, we will circulate a draft set of approaches and topics, along with the target products, to potential stakeholders (e.g., International Seabed Authority, NGOs involved in deep-sea conservation, the deep-sea mining industry, and other groups involved in the use and management of resources at deep-sea vents) for comment. The intent is to assemble a group of objective scientists with broad expertise in this field (including physical oceanography, larval biology, environmental geochemistry, microbial ecology, population genetics, metacommunity dynamics and biogeography) to assemble existing data, interpret it in the context of human disturbance, and disseminate it to the scientific community, the public, and policy makers. Part of this effort will be to identify and evaluate potential ecosystem services from vent communities. These efforts will focus on hydrothermal vent communities in settings where exploitation is possible, but will also include other chemosynthetic-based ecosystems for comparison. Some of the data that may be available include: habitat classification; community typing; source-sink dynamics; species classification in terms of functional groups in a community (e.g. foundation species); valued ecosystem components.
- 2) Use the data synthesis from (1) to identify gaps in our knowledge and facilitate international cooperation in future research in fields relevant to this topic. InterRidge provides an ideal platform

from which to coordinate cruise objectives and schedules and to link modeling efforts. For these coordinating efforts, and for outreach to stakeholders, we plan to cooperate with other international efforts, such as DOSI and INDEEP. Most international efforts (including INDEEP and DOSI) have often discussed the need for a working group with goals such as the one we propose, but none has undertaken the research effort. We are foremost a science group; this is InterRidge's strength and we believe that this approach gives us the best shot at objectivity. We will coordinate with DOSI directly in identifying potential stakeholders to whom our research evidence will be useful. Both DOSI and INDEEP can facilitate the dissemination of our results back to the stakeholders. We will conduct coordination and outreach activities through email and virtual conferencing, in a focused, task-oriented workshop, and as session chairs in a widely attended scientific conference (e.g. Ocean Sciences).

Outputs

This IR working group aims to produce the following products by the end of its 3-year tenure:

- 1) a short, high profile publication in refereed journal highlighting what our synthesized data tell us about how to manage seafloor mining and MPA management
- 2) an in-depth synthesis of data on ecological connectivity and community resilience in the context of human disturbance, intended for wide dissemination as peer-reviewed article
- 3) a plan and initial efforts to coordinate international research on connectivity, resilience and metacommunity dynamics

WG composition

The Chairs and Members of the Steering Committee represent a wide spectrum of disciplines: larval and community ecology (Metaxas, Mullineaux, Watanabe), population genetics (Watanabe, Won), physiology (Hourdez), and physical oceanography (Thurnherr). They represent six countries on three different continents, and are at various stages of their careers. Linkages with relevant international initiatives are ensured through WG membership (DOSI: Levin, Fisher, Tunnicliffe; INDEEP: Metaxas, Thurber).