

InterRidge Theoretical Institute 2019

Hydrothermalism in 4D: current challenges and emerging issues



Dates: 18-22/11/2019

Location: Banyuls-sur-mer, France

Scientific committee: Nadine Le Bris (CNRS & Sorbonne U.), Jérôme Dymont (CNRS), Melissa Anderson (U. Toronto), Philipp Brandl (GEOMAR), Cédric Hamelin (U. Bergen), Stéphane Hourdez (CNRS), Shinsuke Kawagucci (JAMSTEC).

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Scope

New research foci have emerged in the last decade regarding hydrothermal systems. Addressing links between tectonic complexities and magmatic-hydrothermal processes, characterizing hydrothermal contributions to global ocean budgets (e.g. heat, carbon, iron) and associated ecosystem functions, stability and resilience in a wider deep-sea context have inspired a growing number of studies. In parallel, methodological and knowledge needs to support biodiversity inventory, mineral resource exploration, conservation plans and environmental impact assessments have risen. These new challenges emphasized significant gaps in our knowledge of hydrothermal systems and how they interact with other ocean components. While major geological, biological and ecological processes have been elucidated, the temporal dynamics and long-range interactions are still unconstrained for the vast majority of highly diverse hydrothermal settings. A substantial effort, bridging different basic science fields, is still needed to build an integrated vision of hydrothermal processes over space and time, on which quantitative approaches and predictive models should be based.

Through its 4th Theoretical Institute, InterRidge aims at fostering this momentum, by identifying most critical fundamental research questions and by offering the opportunity to share knowledge on emerging issues, new technologies, interdisciplinary challenges including capacity building and methods/tools sharing across disciplines. Bringing together ideas, concepts, expertise and know-how will help developing strategies to fill remaining gaps, and promoting the transfer of knowledge to address questions related to the human global footprint on the ocean. Since 1992, InterRidge is committed to support the advancement of fundamental knowledge, promoting international and cross-disciplinary exchanges and developing synergies with other disciplines and across thematic fields. The Theoretical Institute will contribute setting the scene for its upcoming 4th decade plan and ensure that the growing community of scientists interested in vent systems has access to suitable basic information, while strengthening international collaboration in Mid-Ocean Ridges and Arc & Back-Arc systems research.

Organization

The event will start on Monday morning and end on Friday noon. Like previous Theoretical Institutes, the first 1.5 days will be devoted to a series of lectures, followed by four thematic workshop sessions, each of them being introduced by keynote talks (Tuesday afternoon to Wednesday morning). A poster session on Wednesday afternoon will offer young scientists the opportunity to present their work. The following 1.5 days will be dedicated to writing sessions in small groups and final synthesis.

Lectures are targeting young scientists and should be accessible to an audience gathering different disciplinary backgrounds. They will be open to all participants. International experts will present the advancement of knowledge on key themes in relation to methodological and theoretical progresses at the forefront of current research. The selected topics are:

- Lecture 1. Hydrothermal vent geodiversity: seafloor and sub-seafloor processes
- Lecture 2. Vent microbiomes with combined NGS and experimental approaches
- Lecture 3. Ecosystem dynamics: repeated observation and time-series
- Lecture 4. Connectivity and larval dispersal: metapopulation approach
- Lecture 5. Hydrothermal vent mineralization
- Lecture 6. Aging oceanic crust and seafloor alteration

Workshop sessions will be successively planned on a series of transversal hot topics. Keynotes will present the state of the art from geoscience and ecology-biology perspectives, with a specific attention to processes driving the spatial and temporal variability and will be complemented by short talks to initiate discussions around emerging themes (the proposed list should be considered as a starting point).

1) *Export of vent-derived chemicals: from near-vent reactivity to long-range transport*

Themes: Chemical, biological and ecological drivers of metal export and bioavailability in the water column, biogeochemical processes and metabolic diversity in hydrothermal plumes, hydrothermal sources and sinks of organic carbon.

2) *Chemosynthetic carbon: drivers of productivity at active and inactive vents*

Themes: Functional flexibility of vent symbioses in response to geochemical heterogeneity, seafloor and subseafloor microbial growth and community dynamics, species adaptation to stressor combination arising from habitat fluctuations, chemical energy transfer at vent field scale and export of chemosynthetic organic matter to peripheral areas and water column.

3) *Massive Sulfide deposition, alteration and biological diversity*

Themes: Seafloor and subseafloor mineralization processes and time-scales, sulfide deposit formation and alteration and related geomicrobiological processes, diversity and turnover of deep-sea fauna at inactive vents.

4) *Basin-scale hydrothermalism and related processes from ridges to subduction zones*

Themes: Geophysical evidence of pervasive and/or rejuvenated hydrothermalism, links between tectonic complexities in subduction zones with magmatic-hydrothermal systems in arc and back-arc environments, regional connectivity and larval dispersal of vent invertebrates, biogeography and evolution of hydrothermal vent biological lineages. Hydrothermal heat fluxes contribution to ocean budget.