Refugia and ecosystem tolerance in the Southern Ocean – the RECTO project

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Confronted with fast-paced environmental changes, biota in Antarctic ecosystems are strongly challenged and face three possible outcomes: adaptation, migration or extinction. Past glaciation periods have already forced marine zoobenthos of the Southern Ocean (SO) into refugia, followed by recolonization when the ice retreated. The collaborative Belgian BRAIN project RECTO, "Refugia and ecosystem tolerance in the Southern Ocean", will strive at understanding how such past events have driven diversification and adaptation in different animal groups and how these can be applied as proxies to understand the contemporary situation and predict future scenarios.

With molecular approaches, RECTO will reconstruct population histories and spatio-temporal features of Pleistocene refugia. The RECTO target taxa include birds, fish, sea stars, bivalves, amphipods, and ostracods. For all RECTO target taxa, the following molecular data will be obtained: (1) mitochondrial COI barcodes, (2) ddRAD data, and (3) mitochondrial genomes. In fish and amphipods, RECTO will also study in a novel phylogenetic framework how morphological diversification and trophic adaptability (estimated by stable isotope data) are interacting with each other and whether ecotypes of selected species have faster modes of evolution.

Geographic models on future species and trait distributions based on physiological and energy limits and present and future climate data will be refined and integrated with an Individual-Based Model for the SO. Using the latter model, larval dispersal of selected RECTO model groups (e.g. fish & bivalves) is simulated and compared to genetic patterns. Finally, scenarios of future dispersal abilities and possible habitat shifts of the RECTO target groups will be developed to infer how the RECTO target species will respond to future climate change.

Oral preference

If there will be a session on RECTO, this talk would give an overview on the project.