Autonomous reef monitoring structures in the Southern Ocean, a tool for the study of the understudied small fauna

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Autonomous Reef Monitoring Structures are standardized artificial largely used in shallow, tropical marine locations to assess the cryptofauna (Knowlton et al. 2010, Plaisance et al. 2011, Knowlton et al. 2015). These multilayer type I PVC structures offer a succession of closed and open layers for the small and very small fauna and flora to colonize. They are typically left attached underwater for one year in these warmer environments before recovery and analysis through classical taxonomy and metabarcoding approaches.

We present here the first results for ARMS in the Southern Ocean, close to the Dumont d'Urville french Antarctic station (REVOLTA II program, IPEV). The ARMS were immersed in 2014, and were either left at the locations for two years (recovery in January 2016) or three years (recovery in January 2017).

The plates were photographed, and specimens were sampled both one by one and in a mix for metabarcoding. Three molecular markers were used (mitochondrial genes COI and 16S, and nuclear 18S), as well as multiple wide-ranging primers pairs for each, to maximize the amplification and identification of a wide range of taxonomic groups.

The plates colonized for two years were rather sparse, maybe because of unusual ice conditions at the location, but the plates colonized for three years were richer. Sequence analysis of the three markers yielded generally congruent results, although some groups were not recovered with all. Expectedly, 18S was the less precise of the markers but corroborates attribution to higher taxonomic ranks. Bryozoans and tube worms dominated the plates, with several having close but no identical sequences in the reference databases (Barcode of Life database and GenBank).

Our ARMS were also included in outreach projects to school classes. These structures are a precious tool for the study of the understudied small fixed and sessile organisms in the shallow areas of Southern Ocean, especially if deployed as a network by a collaboration of research projects to cover a wider variety of spatial scales. They provide information on colonization and growth, and a simple but powerful monitoring tool for this changing environment.

References

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