



# HUMAN IMPACTS ON MARINE FUNCTIONAL CONNECTIVITY

## Symposium on Human Impacts on Marine Functional Connectivity

### Book of abstracts

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SEA-UNICORN

Unifying Approaches  
to Marine Connectivity  
for Improved Resource  
Management for the Seas



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## S2 Keynote: Climate change, hurricanes and marine connectivity

**Keynote:** Emmanuel Hanert

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### **Abstract**

Climate change poses an existential threat to marine ecosystems. A warmer and more acidic ocean increases larval mortality, alters the competence acquisition dynamics, changes larval vertical swimming behavior and increases the intensity of hurricanes. All these processes influence marine populations connectivity, a process fundamental to their recovery following disturbances. Here we quantify the impact of these different processes on coral and crab larvae connectivity by using a high-resolution ocean circulation model coupled with a wave model to simulate the effect of major hurricanes, such as Irma that struck Florida coral reefs in Sept. 2017. We show that the increased larval mortality and reduced competency duration due to ocean warming reduce habitat connectivity, hampering recovery after disturbances and reducing the spread of warm-adapted genes. Similarly reduced seawater pH leads to a deeper distribution of crab larvae, hence reducing the distance they can travel, increasing self-recruitment and leading to a more fragmented community structure. While being a brief event, the passage of a hurricane however significantly increases the probability of long-distance exchanges, creates new connections, and reshuffles the usual community structure. Hurricanes can therefore both promote coral resilience by diversifying larval exchanges but also speed-up the propagation of coral diseases. Our results suggest that protection measures will be more effective locally, and may require reducing spacing between protected areas. As hurricanes become more intense and probably also more frequent, they will increase variability within marine ecosystems and hence make their management less predictable.