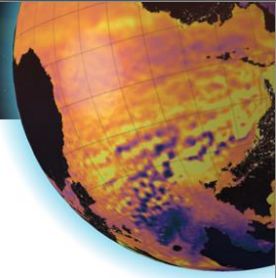




## **BRIDGES-AVATAR: a new research project to building a digital avatar of social-ecological systems of the South-West Indian Ocean**

BRIDGES is a new exploratory research program funded by France2030 over the period 2024-2033 that aims at a paradigm shift for the governance of the commons in order to reduce environmental vulnerability and conflict risks in coastal areas. Through its systemic and innovative vision, BRIDGES will implement ground-breaking studies on regional marine social-ecological systems (SES) in the South-West Indian Ocean (SWIO). This will be achieved through interdisciplinary, multi-sectoral and equitable collaborations to increase knowledge, anticipation, joint management, preservation of natural and exploited marine resources and, ultimately, resilience of coastal territories facing future environmental and socio-economic changes. Within BRIDGES, several targeted projects will be implemented, including BRIDGES-AVATAR to simulate the dynamics of two types of SES associated to (i) coral reef resources (fish, invertebrates, etc.) and related habitats (seagrass, mangroves, etc.) and their interfaces (watersheds and open ocean), and (ii) large pelagic resources (e.g. tuna and by-catch species) and associated coastal and deep ocean habitats. The digital avatar will be used to explore the likely trajectories of these systems in different contexts of climate, economic, societal changes, small-scale fisheries management and marine spatial planning. The digital avatar is conceived as a set of mechanistic and statistical models, complemented by observational data and analytic tools that can be used individually or together to test a variety of "what-if" scenarios. Ultimately, the BRIDGES avatar will provide scientific data and associated uncertainties to guide practitioners towards appropriate strategies for the deployment of spatialized management tools. It will encompass regional climate, physical oceanography, biogeochemistry, marine and coastal ecosystems, fisheries and socio-economic conditions under which the living resources are exploited. A particularly innovative aspect will be the implementation of a combination of quantitative process-based models describing the natural system with simplified, qualitative representations of human drivers such as fishing pressure. The digital avatar will be deployed incrementally over the SWIO region, with the "large-scale" climate information (Indian Ocean basin) feeding into regional domains (around the Mozambique Channel), which in turn will provide environmental conditions for high-resolution systems dedicated to the 5 coastal study sites of BRIDGES (Réunion, Mayotte, Madagascar, Comoros, Mozambique). It will be used to run projections over a period of several decades (typically 2020-2060) to help design Area Based Management Tools such as marine protected areas. The presentation will focus on the research activities planned for the



first six years, and on the opportunities for strengthening international collaborations around BRIDGES-AVATAR.

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