PSI2009/187
Hydrodynamic modeling for pearl oyster aquaculture management: strategy currently implemented for western Tuamotu atolls

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A multidisciplinary 3-year long project funded by the European Development Fund was recently launched to enhance pearl oyster aquaculture management in French Polynesia. The project includes, among many other tasks, a study on the hydrodynamic functioning of Ahe and Takaroa atolls. Significant spat collecting activities occur in the lagoons of these two atolls. The management of this critical activity would benefit from decision-support tools that come with a better understanding of the lagoon circulation.

We present here the strategy used to develop 3D numerical models for Ahe and Takaroa lagoons, and for their proper parameterization and validation. The models implementation require 1) a correct oceanic and atmospheric forcing based on a combination of models, remote sensing and in-situ data, 2) a characterization of the atoll morphology (depth and aperture along the rims) using high resolution remote sensing and in situ measurements, 3) the acquisition of in situ hydrodynamic measurements (tide, current) in lagoons, passes and lagoon across the different seasons, 4) a 3D numerical modeling toolbox and efficient computing architecture that needs to be optimized for different aspects specific to atolls (e.g. the rim structure). Then specialized results from researchers and engineers need to be digested in the form of convenient web-based and printed consultation and decision-support tools for managers of the pearl oyster industry. We present the status of all these actions after one year in the project.

Number of words in abstract: 230
Keywords: pearl oyster aquaculture - hydrodynamics - FED
Technical area: Ecosystems, Biodiversity and Sustainable Development
Special session: Not specified
Presentation: Oral presentation preferred
Special equipment: Video-projector (beamer)