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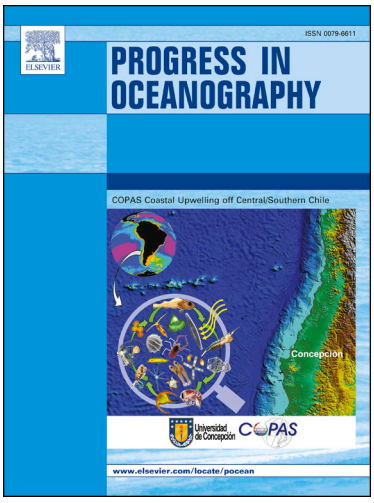

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Ecosystem spatial structure revealed by integrated survey data

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Abstract

Integrated marine survey series such as PELGAS provide comprehensive geo-referenced data over large sea areas in major ecosystem components with defined biological resolution and spatio-temporal sampling scale. These data enable to develop product at different levels of biological organization and spatial scale that are useful for ecosystem integrated assessments. Using the PELGAS integrated data series, we applied a generic procedure made of several steps to identify and map ecologically coherent ecosystem spatial units in the Bay of Biscay. First, the data were interpolated on a common spatial grid and organized as a time series of matrices containing at each time the variables as columns and the grid cell values as rows. The multi-table analysis method known as Multi-Factor Analysis (MFA) was then applied on the series of matrices, thus separating in the analysis the spatial from the temporal variability. Grouping the spatial grid cells based on their relative positions in the MFA space resulted in mapping ecosystem spatial entities based on common spatial patterns across ecosystem components. The result of the analysis is a map of ecosystem seascapes that are consistent over the years together with a map of their inter-annual variability. The ecosystem sub-units were in agreement with sub-regional production systems in the Bay of Biscay. This study thus highlights the possibility to characterize and monitor ecosystem spatial structure and develop indicators thereof for their use in ecosystem assessments. Also, it highlights the importance of identifying spatial limits of production systems for ecosystem description, assessment and management.

Keywords

Integrated surveys, Ecosystems, Spatial structure, Multi-Factor Analysis, Bay of Biscay, Pelagic