Temporal dynamics of seagrass beds and microphytobenthos in Marennes-Oléron bay using time-series MODIS data.

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Résumé

Marennes-Oléron Bay is a shellfish ecosystem with large intertidal mudflats colonized by microphytobenthos and Zostera noltei seagrass beds. In the Eastern part of the bay, microphytobenthos forms biofilms colonizing the sediment surface at low-tide, while seagrass are mainly found in Western part. Seasonal and interannual variations of these two primary producers have been described over a 15-year period using time-series of daily Terra MODIS 250-m images. 380 MODIS scenes were selected between 2000 and 2015 and the Normalized Difference Vegetation Index (NDVI) was calculated, as a proxy of vegetation biomass. Specific thresholds of NDVI were applied to map microphytobenthos ($0 < $ NDVI $ < 0.35$) and seagrass beds ($0 < $ NDVI $ < 0.7$). Microphytobenthos-NDVI showed a high interannual variability, which was less pronounced for seagrass beds. The drivers of the microphytobenthic interannual variability remains to be elucidated. At the scale of the year, the two types of vegetation presented marked seasonal fluctuations. The well-known unimodal seagrass beds development with its characteristic maximum growth in summer was well described over the time-series. Significant correlation was obtained between field biomass measurements and NDVI values, confirming the consistency of the seagrass-NDVI signal. Microphytobenthos was characterized by a main bloom between late winter and early spring followed by a summer decrease and another smaller bloom in fall. This seasonal cycle should be now analyzed over a broad latitudinal range. This study shows that in spite of its low spectral/spatial resolution, the high frequency MODIS images can bring significant information on the spatio-temporal dynamic of intertidal primary producers.

Mots-Clés: microphytobenthos, seagrass beds, intertidal mudflats, NDVI, time series, MODIS

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