

Climate-driven changes in coastal marine systems of western Europe.

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Coastal marine systems, the interface between the ocean and terrestrial realms, are among the most important systems on the planet both ecologically and economically because of their crucial role in earth system functioning. Although direct impacts of human activities on physical, chemical and biological components of these systems have been widely documented, the potential influence of climate variability is less well known. Here, we used data from Service d'Observation en Milieu Littoral (SOMLIT), a marine monitoring programme that has since 1997 collected samples at 12 sites located along the French coasts from 42° to 51°N. Applying standardised principal component analysis (PCA), we documented the year-to-year fluctuations in these coastal systems and evaluated the potential influence of climate variability using data on atmospheric circulation (wind intensity and direction), precipitation and temperature. Our study revealed a pronounced sensitivity of these systems to climate variability. As the impact of climate change may become more prominent in the next decades, this study suggests that climate might strongly influence the marine coastal environment and act in synergism with other anthropogenic pressures to alter the state and functioning of biological and ecological systems and the services they provide.