Changes in a benthic system exposed to multiple stressors: a 40-year time-series in the English Channel

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PeerJ Preprints | https://doi.org/10.7287/peerj.preprints.26745v1 | CC BY 4.0 Open Access | rec: 21 Mar 2018, publ: 21 Mar 2018

Long-term series are an essential resource to assess temporal changes in biodiversity and disentangle the relative role of external and internal factors on community dynamics. In the Bay of Morlaix, benthic samples were collected at one station in a sandy community over a forty-year period (1977-2016) using the same design. During this period, the community was exposed to a major oil spill but also to gradual changes in sediment grain size and temperature. Q-mode and r-mode analyses were performed to describe the trajectory of the community and identify taxa contributing to variation in faunal composition among years. A type 3 Similarities Profiles analysis was carried out to assess which species groups covary coherently. Over time, different periods were reported included the effect of the oil spill, the following recovery period, and a large shift in the community structure in the absence of specific events. The species groups identified by the SIMPER analysis showed very different temporal variations according to the expected species sensitivity to different stressors and to biotic interactions. Our results highlight that benthic community may exhibit highly complex dynamics which cannot be easily assigned to one cause of change, raising the question of a reference status for managers.