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Marine fish traits follow fast-slow continuum along coastal-offshore gradient

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Functional diversity has been shown to promote ecosystem functioning and to increase ecosystem's resilience against disturbances from either natural or anthropogenic origin. However, it is not yet understood for marine ecosystems what the natural drivers are of functional traits that make up functional diversity. In this study, we used a unique dataset containing the spatial occurrence of over 250 marine fish species across Europe's continental shelf seas – ranging from Iceland and southern Greenland to the Mediterranean with a high spatial resolution of ¼ degree. Three-matrix approaches (RLQ and fourth-corner analysis) were used to investigate the relationships between species traits and environmental variables through the information on species occurrences. We compared our results with spatial patterns of community weighted mean traits. We revealed that areas with greater seasonal differences in temperature and primary production, e.g. southern North Sea, Baltic Sea and western Mediterranean, favour small and short-living species. Waters around Greenland and Iceland have low water temperatures and little differences between seasons, and tend to be dominated by larger and longer-lived species with relatively large offspring. We demonstrated that the RLQ and fourth-corner analysis combined with community weighted mean traits were able to reveal relationships between functional traits of fish and their environment. Our results are useful for future studies aiming to relate functional traits to ecosystem functions, e.g. fisheries yield, and to predict of changes in fish species distribution and ecosystem functioning in the light of climate change and other stressors on marine ecosystems.