Title: Marine Environmental heterogeneity detected from the sky helps to estimate biodiversity hotspots across the food web.

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Here we demonstrate how to globally detect regions of high plankton diversity (the lower levels of the trophic chain) and also higher level consumers' diversity using satellite information of 'fluid dynamical niches' characterized by spatially and temporally different dominant plankton communities. The higher the spectral variability, the higher is the species community diversity, occupying different niches, regardless of the taxonomic group under consideration. Spectral heterogeneity is expected to be related to environmental heterogeneity and therefore is used as a powerful proxy of biodiversity. We calculate a diversity proxy using the PHYSAT algorithm on ocean color data as the heterogeneity of the water masses that it detects already integrate, in an explicit or implicit manner, the main information about the pigment, the size and the extruded compounds of the plankton and the biological meaningful physic-chemical characteristics of the water masses where the community develops. This study overcomes the classic problems of fragmented and heterogeneous information, combining biological and environmental context at different scales and making use of large-scale biodiversity databases combined with niche/trophic models and species distribution models (i.e. AQUAMAPS, Ecopath, ECCO2-Darwin). Biodiversity hotspots of consumers result significantly positively related with the remote sensed diversity of primary producers, top predators included.

Keywords: Marine Biodiversity, Satellite Detection, Habitat Heterogeneity, Plankton, Trophic Guilds, Conservation

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