Data Papers

Marine Socio-Environmental Covariates: queryable global layers of environmental and anthropogenic variables for marine ecosystem studies

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Abstract. Biophysical conditions, including climate, environmental stress, and habitat availability, are key drivers of many ecological processes (e.g., community assembly and productivity) and associated ecosystem services (e.g., carbon sequestration and fishery production). Furthermore, anthropogenic impacts such as coastal development and fishing can have drastic effects on the structure and function of marine ecosystems. Scientists need to account for environmental variation and human impacts to accurately model, manage, and conserve marine ecosystems. Although there are many types of environmental data available from global remote sensing and open-source data products, some are inaccessible to potential end-users because they exist as global layers in high temporal and spatial resolutions which require considerable computational power to process. Additionally, coastal locations often suffer from missing data or data quality issues which limit the utility of some global marine products for coastal sites. Herein we present the Marine Socio-Environmental Covariates dataset for the global oceans, which consists of environmental and anthropogenic variables summarized in ecologically relevant ways. The dataset includes four sets of environmental variables related to biophysical conditions (net primary productivity models corrected for shallow-water reflectance, wave energy including sheltered-coastline corrections) and landscape context (coral reef and land cover within varying radii). We also present two sets of anthropogenic variables, human population density (within varying radii) and distance to large population center, which can serve as indicators of local human impacts. We have paired global, summarized layers available for download with an online data querying platform that allows users to extract data for specific point locations with finer control of summary statistics. In creating these global layers and online platform, we hope to make the data accessible to a wide array of end-users with the goal of advancing marine ecosystem studies.

Key words: climate; coastal systems; coral reefs; habitat connectivity; human impacts; human population density; land area; net primary productivity; wave energy.