Project	Sources, Sinks and Subsidies: Understanding Sedimentary Carbon Across Scotland's Coastal Seas
Funding	Scottish Blue Carbon Forum (Scottish Government)
Staff Responsible	Craig Smeaton
Research Team	Craig Smeaton (University of St Andrews) Corralie A. Hunt (University of St Andrews) William R. Turrell (Marine Scotland) William E.N. Austin (University of St Andrews/Scottish Association of Marine Science)

Metadata Type	**Details**
Data Resource ID	UK EEZ Surficial Sedimentary Carbon
Description of dataset	Spatial mapping of the organic carbon (OC) and inorganic (IC) in the top 10 cm of sediments found on the seabed of the United Kingdom's Exclusive Economic Zone (EEZ) and within the territorial waters of UK Crown Dependencies of the Isle of Man and the Channel Islands.
Locations of the observations	United Kingdom Exclusive Economic Zone (UK EEZ) and the territorial waters of the Isle of Man and Channel Islands. Geographic Extent: -26.243, 64.133 -26.243, 47.255 3.64, 64.133 3.64, 47.255
Location Descriptions	The mapped parameters extent across the UK EEZ and the Crown Dependencies of the Isle of Mann and the Channel Islands.
Names of the variables or parameters observed or simulated	Porosity (Φ) Dry Bulk Density (kg m^{-3}) OC Content (% wt.) IC Content (% wt.) Organic Carbon Density (kg OC m^{-2}) Inorganic Carbon Density (kg IC m^{-2})

All procedures used to make observations or simulations (field/lab where applicable)	**Spatial Modelling:** For each of the point observation with Fraction Mud, (F_{mud}) data a sediment type and location specific OC and IC values with associated errors were assigned. Simple Kriging, with spherical semi-variogram (Cressie, 1990) was used with Gaussian geostatistical simulations (Li and Heap, 2014) to spatially model the F_{mud} across the UK EEZ seabed. The porosity (Φ) and dry bulk density (kg m^{-3}) of the 16 sediment classes was modelled following the methodology of Diesing et al, (2017). The porosity of the sediment type was modelled using F_{mud} in conjunction with an equation from Jenkins (2005). The dry bulk density of each sediment class was calculated by combining the modelled porosity with the grain density of different sediment types (Diesing et al, (2017). The C stock and C density were mapped by combing the pre-assigned OC and IC values with the modelled bulk density data. All calculations were carried out within the raster calculator tool of ArcGIS using Gaussian geostatistical simulations (Li and Heap, 2014).
Calibration procedures, where applicable	NA
Statistical treatment of the observations or simulations	Simple Kriging with spherical semi-variogram (Cressie, 1990) Gaussian geostatistical simulations (Li and Heap, 2014) Block cross-validation (Valavi et al., 2019) Random cross-validation models (Kuhn and Johnson, 2013)
Data checking procedures (quality control)	To validate the spatial model, OC and IC values were extracted from the model and compared to the independent ground-truthing datasets with the coefficient of determination (R^2) being utilised to test the performance of the model. Cross-validation of the results were undertaken in the BLOCKCV package (Valavi et al., 2019) to negate underestimations of errors due to the possibility of spatial autocorrelation between the model outputs and the validation datset. Within BLOCKCV the mapped C across the UK EZZ was split into 370 equally sized blocks (2,000 km^2) based upon the ICES statistical grid, blocks without ground-truthing data were discarded (*n = 84*). For each ground-truthing sample, a spatial block was affiliated by spatial location. Random cross-validation models (Kuhn and Johnson, 2013) were run using data from all but one spatial block, with the model performance being estimated from the missing data. Model performance was gauged using the Root-Mean-Square Error (RMSE), R^2 and the Kappa Index (Cohen, 1960).

File formats used	.Shp .GeoTIFF .lyr .lpk
Other information	**Spatial projection:** WGS84 **Software:** ESRI ArcGIS , R (Statistic Package – BLOCKCV)
References	Cohen, J., (1960). A coefficient of agreement for nominal scales. *Educational and psychological measurement, 20(1), pp.37-46*. Cressie, N. (1990). The origins of kriging. *Math. Geol. 22, 239–252.* doi: 10.1007/ bf00889887 Diesing, M., Kröger, S., Parker, R., Jenkins, C., Mason, C., and Weston, K. (2017). Predicting the standing stock of organic carbon in surface sediments of the North–West European continental shelf. *Biogeochemistry* 135, 183–200. doi:10.1007/s10533-017-0310-4 Jenkins C (2005) Summary of the onCALCULATION methods used in dbSEABED. http://pubs.usgs.gov/ds/2006/146/docs/onCALCULATION.pdf. Accessed 3rd June 2020. Kuhn, M. and Johnson, K., (2013). Applied predictive modeling (Vol. 26). New York: Springer. Li, J. and Heap, A.D., 2014. Spatial interpolation methods applied in the environmental sciences: A review. *Environmental Modelling & Software, 53, pp.173-189*. Valavi, R., Elith, J., Lahoz-Monfort, J.J. and Guillera-Arroita, G., (2019). block CV: An r package for generating spatially or environmentally separated folds for k-fold cross-validation of species distribution models. *Methods in Ecology and Evolution*, *10*(2), pp.225-232