

## MASTS Small Grant Report - SG442

### Scotland's Blue Carbon: Unlocking the Potential of National Sample Archives

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#### **Background**

The marine environment plays a pivotal role within the global carbon cycle and has been a sink for atmospheric CO<sub>2</sub> since the Industrial Revolution (Regnier *et al.*, 2013). Marine sediments are a long-term store of carbon; sediments of the Continental Shelf account for 80-90% of the organic carbon stored in the marine environment globally (Hedges and Keil, 1995). Recent research into Scottish marine sediments, has highlighted the importance of this environment as a long-term store of carbon, known as *blue carbon*, and its potential role in climate regulation (Burrows *et al.*, 2014; Smeaton *et al.*, 2017).

The BGS Core Store facility hosts a significant archive of marine sediment samples that have been collected across the UK's continental shelf since the early 1960s. This archive provides huge potential to contribute to our spatial and temporal understanding of the sedimentary carbon store across the Scottish Continental shelf and to demonstrate the value of sedimentary carbon stocks as a worthy natural capital resource.

#### **MASTS Small Grant Funding**

This MASTS Small Grant was used to facilitate a site visit to the BGS National Core Store in Keyworth where I undertook an intensive week of sediment subsampling. My study focussed on the spatial distribution of sediments to illuminate potential relationships between sediment location, sediment type and associated carbon content.

In preparation for this visit, the BGS Offshore Core Index, an online database of all geoscience data held by BGS (<http://www.bgs.ac.uk/geoindex/offshore.htm>), was interrogated to select a large sample set covering a broad spatial distribution across the Scottish Continental Shelf that also represented the assorted sediment classes (using the Folk & Ward classification).

During the week at the Core Store, a daily selection of samples was retrieved for subsampling from the archive. Detailed metadata, including photos and visual descriptions of the sediment were also collected. In total, 280 samples were collected over a geographic area ranging between 58° N, 0°W and 60°N, 4°W.



Figure 1 - Maximising the potential of a national archive through rigorous subsampling and documentation of relic continental shelf sediments

The relic samples will be preserved via a freeze-drying process before analyses of sediment physical properties and carbon content are undertaken to generate a unique dataset to investigate relationships between sediment and organic carbon. Spatial data will be used to generate a sedimentary carbon map for the Scottish Continental Shelf, in addition to having the potential for use in predictive spatial models.

The data output will contribute to:

- enhancing our understanding of the ecosystem services provided by marine sediments as carbon sinks;
- improving our spatial knowledge of carbon storage to inform marine management policy;
- increasing our ability to quantify the standing stock of carbon on the SCS to better understand the impact of climate change on this store and;
- address the challenges of climate change through protection of this carbon store as part of climate mitigation strategy.

### **Acknowledgements**

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## **References**

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Regnier, P. *et al.* (2013) 'Anthropogenic perturbation of the carbon fluxes from land to ocean', *Nature Geoscience*, 6(8), pp. 597–607. doi: 10.1038/ngeo1830.

Smeaton, C. *et al.* (2017) 'Scotland's forgotten carbon: a national assessment of mid-latitude fjord sedimentary carbon stocks', *Biogeosciences*, 14(24), pp. 5663–5674. doi: 10.5194/bg-14-5663-2017.

**Breakdown of Expenditure**

<b>Cost</b>	<b>Amount</b>	<b>Source of Funding</b>
Transport	£131.45	MASTS SGS
Accommodation	£276.00	MASTS SGS
Subsistence	£150.00	Uni of St Andrews
Consumables	£50.00	Uni of St. Andrews
In-kind	£600.00 +VAT	BGS Academic Waiver
<b>TOTAL</b>	<b>1,207.45</b>	-