

APPENDIX DR1Map compilation

The extent of the data coverage underpinning our mapping is indicated in Figure DR1. In the study area, the dataset largely comprises four decades of geophysical and geological acquisition by the British Geological Survey (BGS) as part of its reconnaissance mapping programme of the United Kingdom continental margin. From 2000 to 2003, these data were combined with additional industry and non-industry data as part of the EC-supported STRATAGEM project (Stratigraphic development of the glaciated European margin), which extended the available seismic coverage southwestwards to about 51°N and northeastwards to about 69°N. The seismic database comprises tens of thousands of line-kilometres of reflection-seismic profiles (high-resolution single and multi-channel), with a grid spacing of about 5 km along the western seaboard of Britain (including the Rockall and Faroe-Shetland basins), but less dense on the outer margin (Rockall Plateau) (cf. Evans et al., 2005 for details). A unified Cenozoic stratigraphy derived from the seismic database has been calibrated and correlated (using biostratigraphy) by released commercial and non-commercial (BGS, DSDP, ODP) wells and shallow boreholes along this length of the NW European margin, the details of which have been published by Stoker et al. (2005).

In this study, the distribution and thickness of the Eocene and Oligocene successions has been determined from regional offshore mapping by the BGS (Stoker et al., 1994; British Geological Survey, 2002, 2007; Stoker, 2010; Stoker & Varming, 2010) and from commercial seismic datasets (Robinson, 2004). For the Miocene–Lower Pliocene and Lower Pliocene–Holocene successions we utilized the STRATAGEM database. The bounding

surfaces of all these successions are major regional unconformities that can be traced and correlated along the entire margin, and are dated by the biostratigraphic data to within 1–5 My precision (Stoker et al., 2005; McInroy et al., 2006).

We present our maps of preserved sediment thicknesses in seconds (s) two-way travel time (TWTT). Accurate depth conversion for Cenozoic sediments along the Atlantic Margin is difficult because of the drilling of relatively few wells, especially in the deep water Rockall Basin. Sound velocities in the Cenozoic post-breakup succession are of the order 1.5–2.0 km s⁻¹, so the thicknesses in TWTT can be taken as maximum estimates in kilometres (i.e. 1 s TWTT is ≤1 km).

APPENDIX DR2

Calculation of total sediment volumes

We estimated volumes by converting our TWTT maps into depth-maps using representative end-member velocities for the Cenozoic succession of 1.5 and 2.0 km s⁻¹. We then subtracted the pore-space volume predicted by a standard exponential porosity-depth relationship ($\Phi = \Phi_0 \exp(-z/\lambda)$ where Φ is the fractional porosity, $\Phi_0 = 0.6$ is initial porosity, z is depth and $\lambda = 2$ km is the compaction coefficient). We digitized the corrected solid grain volume thickness maps and using Surfer 8TM produced grids applying the Nearest Neighbour method from which we then calculated volumes from using an Extended Trapezoidal Rule.

All of our estimates should be considered as minima because of uncertainties in the total thickness of each succession, particularly in the main depocentres where well control is poor. Our estimates will invariably include a certain proportion of pelagic and hemipelagic sediments that have been derived from erosion of source areas beyond the British Isles and

from the Rockall–Faroe region, as evidenced by the increasing influence of Oligocene-onwards bottom current activity. Furthermore, there is evidence for erosion of the post-rift succession itself e.g. the regional intra-Cenozoic unconformities and the compression-influenced sedimentation patterns in the Miocene-Early Pliocene. Our calculated total sediment volumes are compared with previous estimates from the Rockall and Faroe-Shetland basins, and adjacent basins, in Table DR1.

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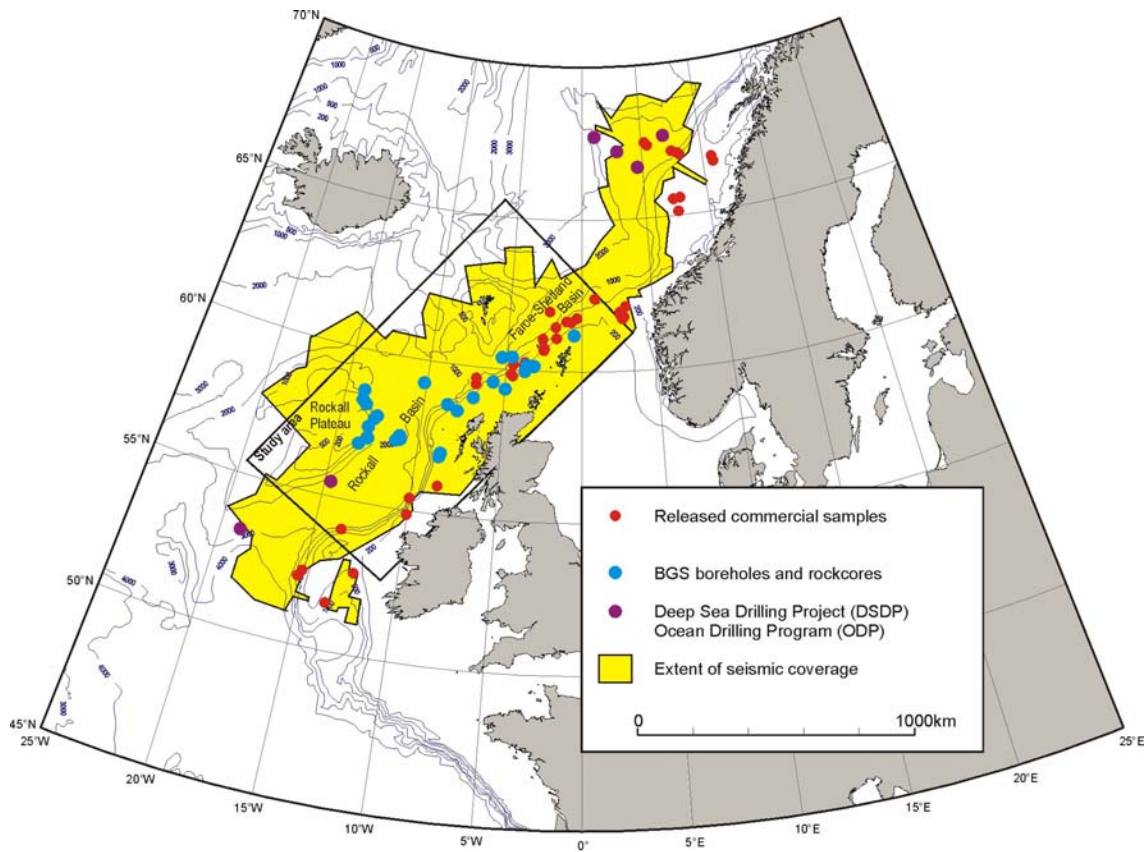


Figure DR 1. Data location map - geophysical and geological data that provide the basis for the regional mapping

Table DR1. Comparison between calculated total sediment volumes derived for this study with previous estimates.

	Undifferentiated Cenozoic	Paleocene	Eocene	Oligocene	Miocene–Lower Pliocene	Lower Pliocene–Holocene
Faroe- Shetland Basin	~55–70,000 km ³ (Jones et al., 2002)	35–55,000 km ³ (Smallwood, 2005)	48,000 km ³ (Smallwood, 2008)			
Rockall Basin	~60–95,000 km ³ (Jones et al., 2002)					
Faroe Shetland and northern Rockall basins (this paper)			57,500–76,800 km³	16,300–22,500 km³	35,100–48,800 km³	37,900–52,100 km³
Porcupine Basin	~50–60,000 km ³ (Jones et al., 2002)					
Northern North Sea Basin	~95–115,000 km ³ (Jones et al., 2002)	26,000 km ³ (Reynolds, 1994; White & Lovell 1997) 36,301 km ³ (Liu & Galloway 1997)	51,598 km ³ (Liu & Galloway 1997)	41,502 km ³ (Liu & Galloway, 1997)	21,400 km ³ (Liu & Galloway, 1997)	
TOTAL	~260–340,000 km ³					