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1 The influence of sediment drift accumulation upon the passage of gravity driven flows within the Iceland Basin

G.M. Elliott and L.M. Parson

Geology and Geophysics NSRD, National Oceanography Centre, European Way, Southampton, SO14 3ZH, UK (gme@noc.soton.ac.uk)

The Maury Channel is a deep-sea sediment transport system located in the Iceland Basin and extends from the Icelandic plateau southwards towards the Charlie-Gibbs Fracture Zone (CGFZ). This study has utilised multibeam bathymetry and multi-channel seismic reflection data along 480 km of its pathway. The channel is located at the foot of the Hatton Bank, and in the north of the region it is predominantly broad ($>$20km) and shallow ($\sim$10 m). The surface morphology of the channel changes to the south, where it narrows (5-10 km) and locally deepens to 150m. The channel sinuosity increases to the south, before it finally discharges onto the Eriador Plain to the north of the CGFZ.

The Maury Channel is located within the Iceland Basin, for which sediment is sourced from the eroding Iceland plateau. DSDP Site 115 sampled a suite of volcaniclastic turbidites of unequivocal Icelandic provenance. This turbidite sequence produces a distinct high velocity and reflection amplitude anomalies on seismic reflection profiles. This allows mapping of the sediment package over, an area of at least 26,000 km^2.

The southern edge of the high velocity unit is delimited by onlap onto the flanks of the Miocene (and younger) Gardar Drift. The drift appears to have initially acted as a barrier to southerly flows and promoted the ponding of flows in the so-called “Gardar Basin”. From DSDP Site 609, close to the CGFZ, the presence of mid- to late Pliocene fine-grained volcanogenic turbidites implies that stripping of the finer fraction of the

flow occurred with the coarser fraction absent.

Continued sediment supply (turbidite sedimentation rates estimated at 27cm/1000 year) from Iceland eventually filled the Gardar Basin leading a breach and overflow of the Gardar Drift dam. A result was the initiation of the Maury Channel. To the south of the breach, the Maury Channel rapidly becomes incised and sinuous. This incision may be due to the gradient change promoting increased flow efficiency and also due to the passage across more erodable substrate. The release of this enhanced sediment supply may have also initiated the infill of the Eriador Plain.

The age of initiation of the Maury sediment pathway system is not well constrained, but is likely to have coincided with the onset of widespread glaciation in Iceland ca.3 Ma. The present day activity of the channel system is also unknown but the frequent jökulhlaup (massive glacial meltwater outflow events triggered by sub-glacial volcanic eruptions) events that occur in Iceland undoutably supply high sediment flux to the shelf edge and potentially to the slope and the deep basins to the south.

The evolution of the Maury fan and channel system highlights the important role of sediment drift accumulation upon the geomorphic evolution of the deep abyssal plains of the oceans. These drifts not only mould the seafloor through their bathymetric development but also through the building of this seafloor topography influence the passage of gravity driven sediment laden flows along the seafloor.