**Supplementary information 3: XRF analysis and datasets**

XRF (X-ray fluorescence) major element analysis was undertaken at the University of Leicester, UK to determine the weight percent of major elements as oxides. The XRF laboratory at the University of Leicester operates a PANalytical Axios Advanced X-Ray Fluoresence spectrometer which runs a 4Kw Rhodium (Rh) anode end window super sharp ceramic technology X-Ray tube. The major element analysis was performed on fused beads to eliminate mineralogical effects and reduce inter-element effects.

Other datasets used by this study include: the NOAA total sediment thickness data Version 2 ([Whittaker et al., 2013](#_ENREF_62)); and Smith and Sandwell global topography and Bathymetry Version 18.1 ([Smith and Sandwell, 1997](#_ENREF_48)). Our investigation into offshore sediment distribution utilises Version 2 of the NOAA total sediment thickness dataset despite the update of the original only applying to the Australia-Antarctic region as this was the latest version available at the time of this work. The NOAA total sediment thickness dataset has a grid resolution of five by five arc-minutes, with the data contributing to this dataset obtained from sources including; previously published isopach maps, ocean drilling results and seismic reflection profiles. Version 18.1 of the global topography and bathymetry data ([Smith and Sandwell, 1997](#_ENREF_48)) dataset is primarily sourced from multibeam cruise data, supplemented by Version 23 ([Sandwell et al., 2014](#_ENREF_45)) of the satellite derived free air gravity.