#### Core-specific results

In core K1, the majority of both sandy and muddy samples had similar δ13C and N/C values of -24.01 to -25.04 ‰ and 0.153 to 0.209 respectively. TOC (corrected for carbonate dissolution) was fairly constant in the mud (average 0.42 %) but higher at the core top, 0.59 %. Within the sand, the coarse nature of the POC gave very variable measurements in the lower units. Where a coarse POC particle was included in the 5 g aliquot (sample K1-41), TOC content rose to 1.12 %, with much lower δ13C (-25.86 ‰) and N/C (0.071). These values are similar to modern woody material, which would agree with the presence of a large wood fragment in the sample. However, the 14C composition of core K1-41 shows that, with an Fmod of 0.36, it was still dominated by old carbon. This means that there must also have been significant amounts of fossil carbon with a low δ13C and N/C ratio present in the sample.

The muddy section of K12 had an average TOC of 0.36 wt%, whilst the eight samples from the sandy core segment had a very constant TOC of 0.22 ± 0.036 (2σ) wt %. The sandy samples without visible POC had the highest N/C ratio in this study, around 0.29, with δ13C of -23.4 ‰ (see Fig. 4c). Whilst total organic carbon in this sample was low, the relative proportion of graphite particles was high (Sparkes et al., 2013). With δ13C of -23.63 ‰ and N/C of 0.287, sample K12-17 was very similar to measured bedrock units (Hilton et al. (2010)).

Within core K25 the lower five samples had very similar δ13C and N/C values, with -25.0 ± 0.37 ‰ (2σ) and 0.18 ± 0.03 (2σ) respectively. The core-top sample, K25-0, had the highest TOC at 0.48 %, with 0.39 % average TOC lower in the core.

Core K8 had a very variable TOC composition, ranging from 0.26 to 1.36 %. Samples K8-2 and K8-4 had the lowest TOC and δ13C and N/C similar to cores K1, K12 and K25. The other samples all had TOC higher than 0.8 %, which is significantly higher than the average of the material in this study. This enrichment was due to the presence of ample coarse POC in the samples, giving rise to a low N/C ratio (average 0.086). Isotopic measurements were more varied; sample K8-8 had a δ13C composition of -22.9 ‰ whilst the other three high-TOC samples averaged -25.35 ‰. The large amounts of coarse woody material in these core samples were likely responsible for such variations in δ13C. It is likely that the increased amount of OCmarine in this core predicted from endmember mixing results is an artefact of the large amount of OCbiomass, particularly if that biomass comprises C4 vegetation.

Core K8X was similar to the more proximal canyon cores. The lowest sample, K8X-18, was wood-rich and had the highest TOC (0.55 %) and lowest δ13C (-25.00 ‰) of this core. The upper samples had very uniform N/C (0.20 ± 0.06) and δ13C (-24.48 ± 0.53 ‰). TOC in these samples was quite uniform at 0.24-0.33 %, but reached 0.44 % at the core top.

Core K15 yielded very uniform δ13C and N/C measurements (-24.45 ± 0.12 ‰ and 0.20 ± 0.01 respectively), both in the mud and fine sand. TOC decreased with depth, from 0.53 % at the core top to 0.31 % at the base of the core, 5 cm below.

In core K11, δ13C had values heavier than the canyon cores, ranging from -22.5 ‰ to -23.3 ‰, while N/C ranged from 0.17 – 0.19 (see Fig. 4b). TOC was also relatively high in this core, with an average of 0.52 %. Three 14C results gave an Fmod of 0.294 to 0.366.

In core L9, δ13C measurements varied between -25.0 ‰ and -23.0 ‰ with N/C ratios between 0.15 and 0.20. This is a similar range to sample K11, which had similar sedimentology and TOC values. Radiocarbon measurements showed this core to be enriched in 14C, the youngest samples have Fmod = 0.46. The top few cm of this core were different to the rest of the core, both in appearance and carbon isotope composition. Samples below the core top were significantly less depleted in δ13C than the core top itself, -25 ‰ at the core top compared to -23.45 ± 0.61‰ elsewhere in the core.

#### Core-specific end-member unmixing results

The concentration of OCmarine was low in all sections of core K1, 0.11 wt% C or less (see Fig. 6). OCpetro-meta input was also fairly constant at 0.22 to 0.42 wt% C and there was a peak in OCbiosphere + OCpetro-sed matching that seen in the 14C and hand specimen analysis, at K1-41. The lower, sandier part of this core was dominated by coarse woody debris, contributing up to 1 wt% C depending on whether or not cm-scale pieces of wood were included in the sample aliquot. This coarse terrestrial biomass was not present in the mud above. Fine OCbiosphere and OCpetro-sed added about 0.2 wt% C to the muddy sections, with the core top richest in this material at 0.28 wt% C.

K12 was dominated by fossil carbon, with a slight increase in terrestrial biomass at the core top. OCmarine concentrations were less than 0.1 wt% C in all samples. OCbiosphere and OCpetro-sed only made a significant contribution at the core top, 0.12 wt% C. It was rare in lower parts of the core, averaging 0.03 wt% C.

Core K25 contained a low amount of OCmarine, less than 0.1 wt% C in all samples. Fossil carbon was uniformly distributed, averaging 0.23 wt% C. The variance in δ13C and TOC seen in the geochemistry is explained by variations in the amount of OCbiosphere and OCpetro-sed in the core, up to 0.36 wt% C at the core top. In δ13C – N/C space, the core top plots away from the trend shown in the other samples (Figure 3a). Linear regression of the three most proximal cores (K1, K25 and K12) show that all three lie along a similar line (r2 0.74), with core K12 furthest from the typical values of OCbiosphere and OCpetro-sed.

End-member mixing calculations showed that there was up to 1.21 wt% C OCbiosphere and OCpetro-sed in core K8. The high δ13C value (-22.9 ‰) of sample K8-8 led to an apparent increase in OCmarine away from the <0.2 wt% C shown in the other samples. This is likely to be an artefact caused by the representation of a wide range of vegetation compositions, including the possibility of C4 plant debris, with a single value of δ13C. Apart from this sample, the mixing results suggested that there was a near-constant amount of OCpetro-meta in all samples, with changes in TOC mirrored by changes in the amount of OCbiosphere and OCpetro-sed. This was confirmed by visual analysis of the samples, where the sections rich in visible woody debris matched to the mixing results.

In core K8X, the coarse woody debris at the base of the core, seen when sampling, was confirmed in the mixing results - OCbiosphere and OCpetro-sed contributed 0.36 wt% C. Both OCbiosphere and OCpetro were enriched in the core top; apart from the very base, they co-varied. OCmarinewas very low, less than 0.1 wt% C in all samples. All samples again plot on a trend between terrestrial biomass and the bedrock carbon compositions of (Hilton et al. (2010)).

End-member mixing results from core K15 also showed a rise in OCbiosphere + OCpetro-sed at the core top, 0.19 wt% C compared to about 0.10 wt% C down-core. OCmarine was again low in this core, below 0.1 %, as in all canyon samples.

Samples in core K11A did not lie on the trendlines shown in more proximal cores. For a given N/C value, δ13C was significantly higher than for cores in the canyon. This could be caused by the addition of marine carbon with a higher δ13C value to the sediment, but also by the addition of fossil carbon. The Fmod value calculated from Δ14C is higher than for core K1, suggesting that increased marine carbon input to this core is the likely cause of higher δ13C values. Calculations showed much more OCmarine throughout core K11A than the canyon samples, up to 0.27 wt% C. Further, there was a weak trend towards biomass values of δ 13C and N/C, with the core-top sample K11-0 having the highest TOC (0.69 %) and highest contribution from biomass, 0.25 wt% C as opposed to 0.10 wt% C further down. OCpetro-meta concentrations averaged 0.23 wt% C.

Core L9 showed a similar pattern to core K11. There was around 0.2 wt% C OCmarinein all sections except the core top. The OCpetro-meta concentration was fairly uniform, averaging 0.35 wt% C, and the OCbiosphere and OCpetro-sedconcentration averaged 0.24 wt% C. Most interesting was the core top, in which the concentration of marine carbon dropped significantly; sample L9-0 plotted away from the other core L9 samples in N/C vs. δ13C space. This sample had a composition much more like the canyon samples, which suggests that terrestrial material from the river was deposited on the shelf at some point.