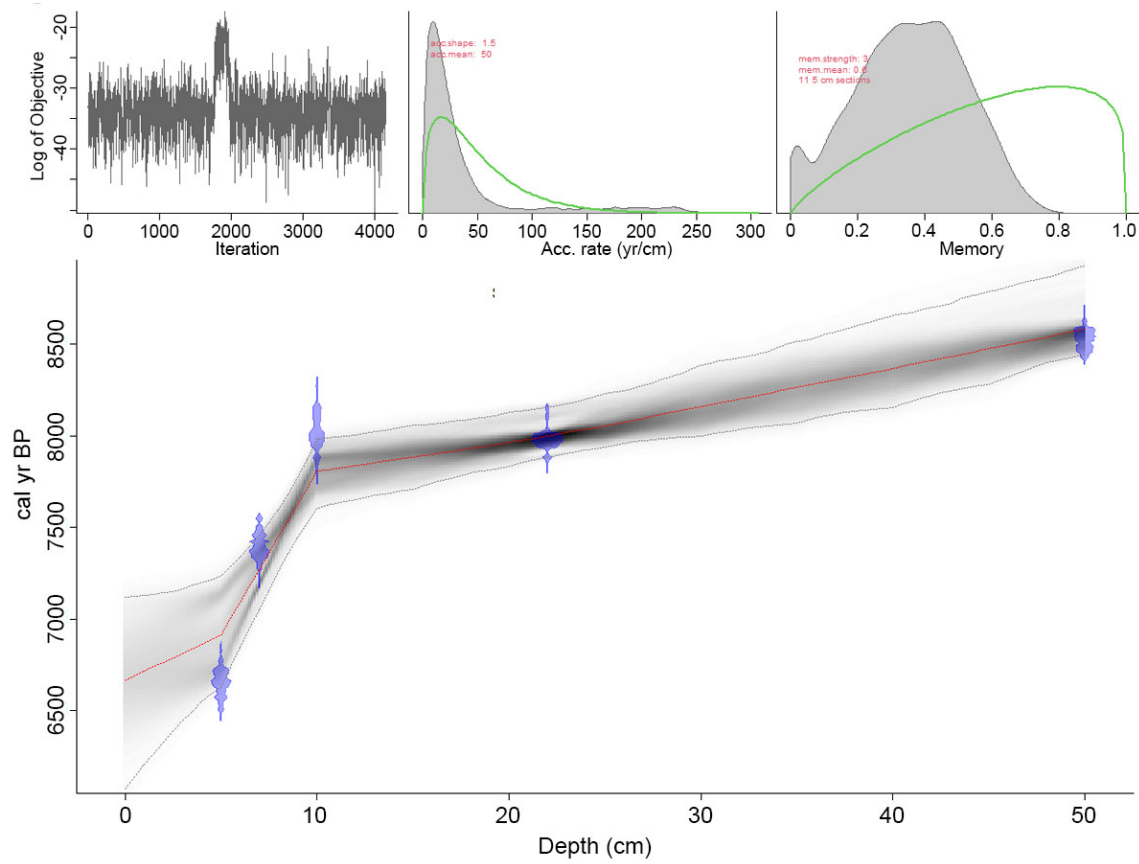
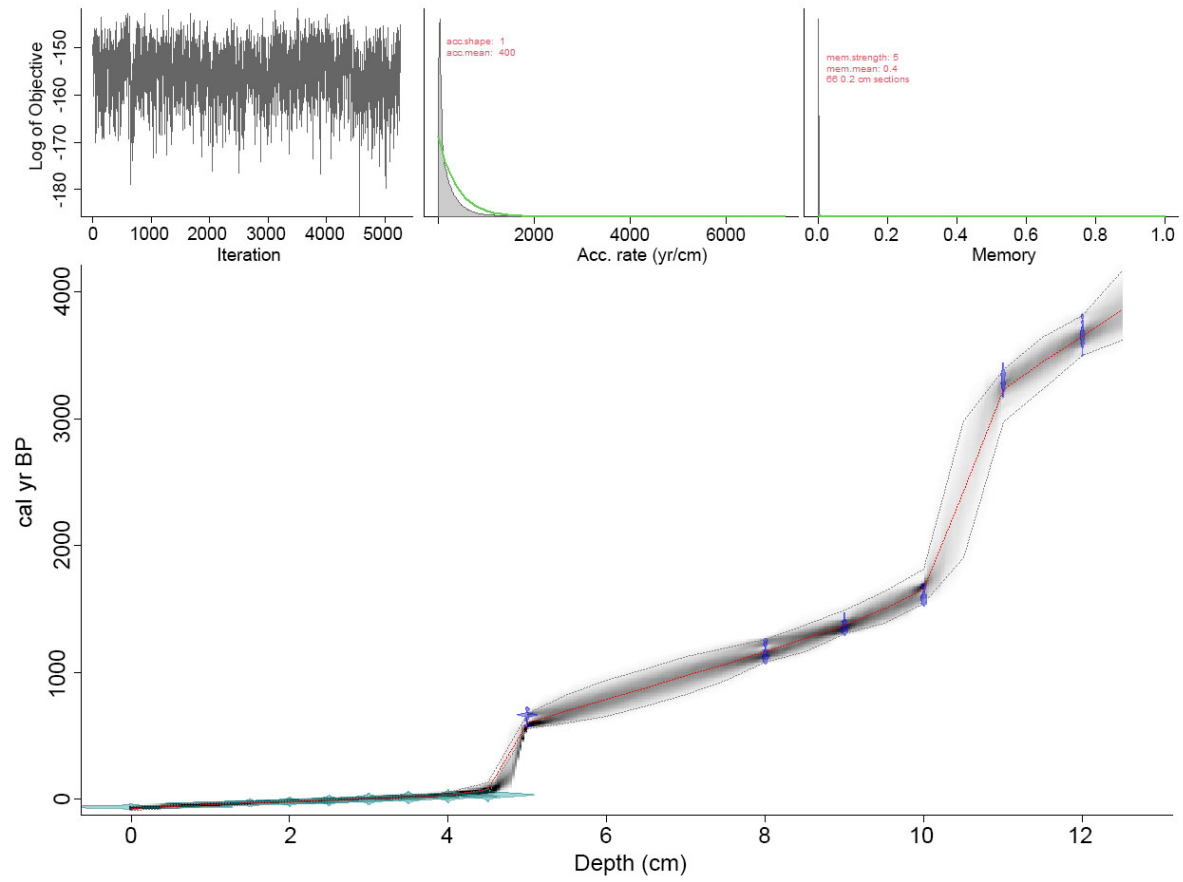


## *Supplementary Material*

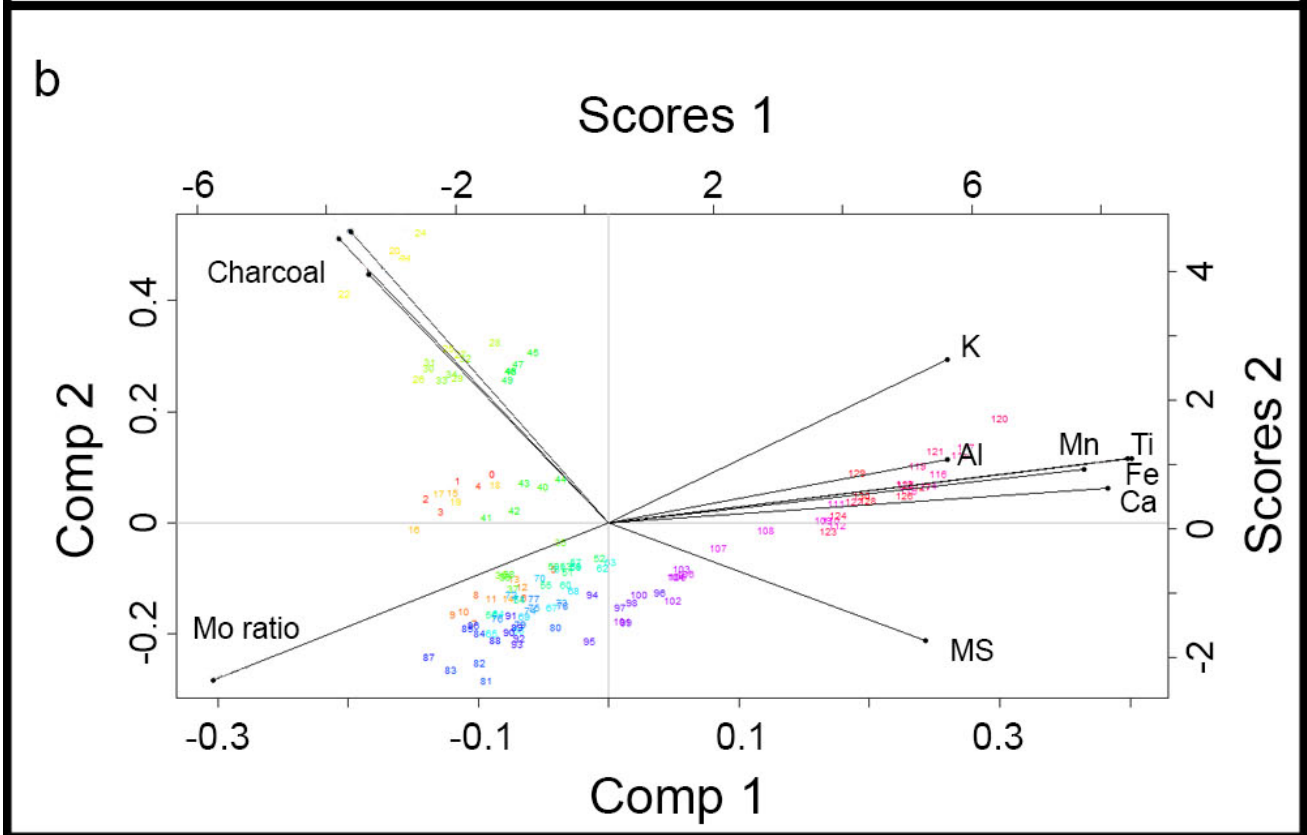
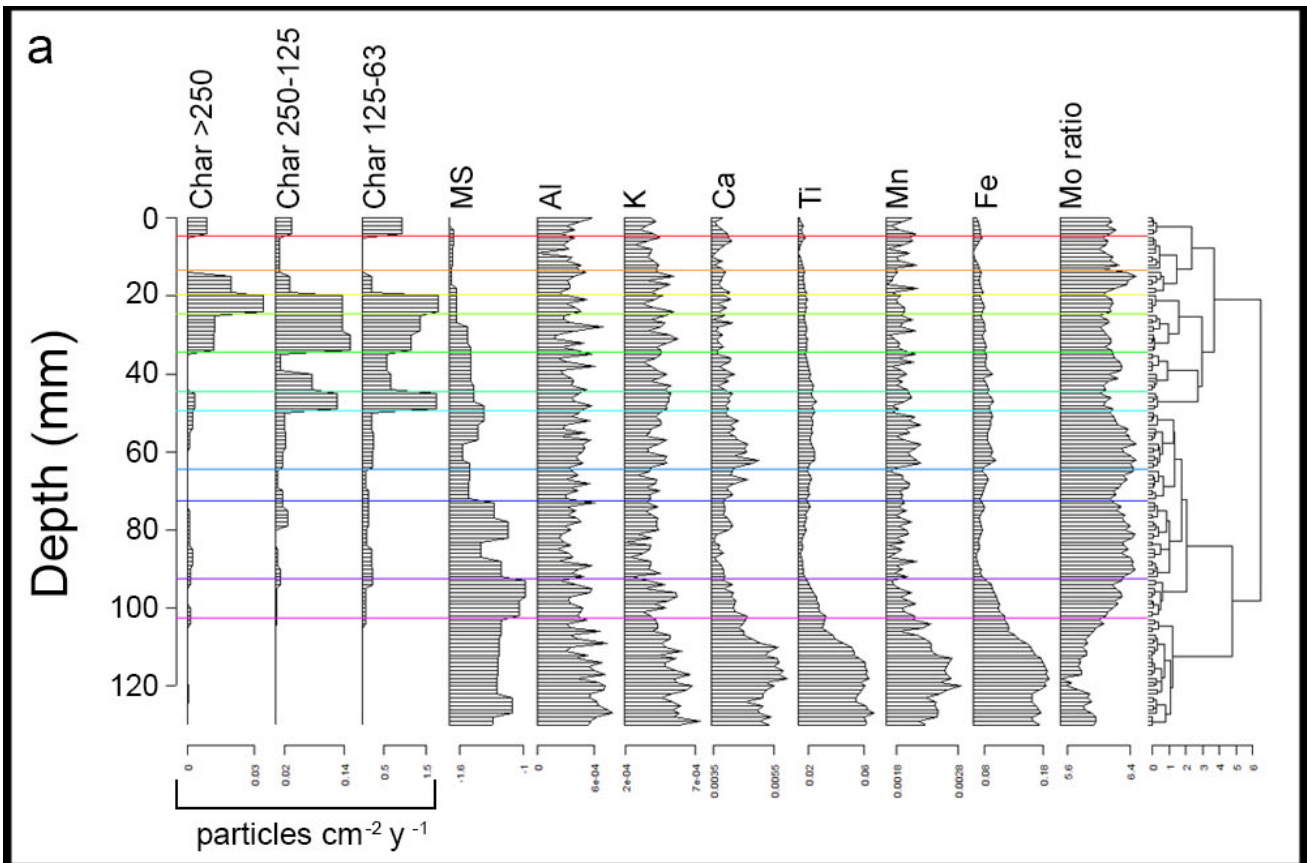
### **1 Supplementary Data**



**Figure S1.** Age-depth model for Sanamere Lagoon (SAN1), from radiocarbon dates (blue). Grey lines represent 2 $\sigma$  range and the red line represents the median.



**Figure S2:** Age-depth model for Big Willum Swamp (BWIL2), with lead-210 dates indicated in green and radiocarbon dates in blue. Grey lines represent  $2\sigma$  range and the red line represents the median.



**Figure S3:** Sediment elemental composition, magnetic susceptibility (MS) and charcoal fluxes for the uppermost 13 cm of BWIL2: a) stratigraphic plot, and b) Principal Components Analysis (PCA). Coloured numbers (sample depths) in plot b correspond to coloured depth zones identified by clustering in plot a.

**Table S1.** Radiocarbon dates for SAN1.

ANSTO Code	Sample Type	ID	$\delta(^{13}\text{C})$ per mil	% Modern Carbon	Conventional radiocarbon age
				pMC $\pm 1\sigma$ error	yrs BP
OZW500	Hypy residue	SAN1 10-10.5cm	-26.3	40.63 $\pm$ 0.33	7,230 $\pm$ 70
OZW502	Sediment	SAN1 22-22.5cm	-27.5 $\pm$ 0.1	40.82 $\pm$ 0.15	7,200 $\pm$ 30
OZW503	Sediment	SAN1 50-50.5cm	-26.4 $\pm$ 0.1	37.90 $\pm$ 0.12	7,795 $\pm$ 30
OZX213	Sediment	SAN1 5-5.5cm	-26.1 $\pm$ 0.1	48.10 $\pm$ 0.19	5,880 $\pm$ 35
OZX214	Sediment	SAN1 7-7.5cm	-25.0	44.34 $\pm$ 0.26	6,535 $\pm$ 50

**Table S2.** Lead-210 dates for BWIL2.

ANSTO Code	ID	Unsupported $^{210}\text{Pb}$ decay corrected to 3-Oct-17 (Bq/kg)	Calculated CIC ages (years before collection in 2015)	Mean calculated age from age-depth model (years cal BP)
U090	BWIL2 0-0.5cm	164 $\pm$ 17	5 $\pm$ 5	-70
U093	BWIL2 1.5-2cm	73 $\pm$ 6	35 $\pm$ 6	-32
U094	BWIL2 2-2.5cm	59 $\pm$ 5	46 $\pm$ 6	-20
U095	BWIL2 2.5-3cm	61 +/- 6	56 +/- 6	-9

U096	BWIL2 3-3.5cm	22 +/- 3	67 ± 7	3
U097	BWIL2 3.5-4cm	21 +/- 3	77 ± 7	16
U098	BWIL2 4-4.5cm	16 +/- 5	88 ± 8	31
U099	BWIL2 4.5-5cm	8 +/- 4	99 ± 9	75
U530	BWIL2 5-5.5cm	6 +/- 4	109 ± 9	606
U534	BWIL2 6.5-7cm	3 +/- 4	142 ± 11	714

**Table S3.** Radiocarbon dates for BWIL2.

ANSTO Code	Sample Type	ID	$\delta(^{13}\text{C})$ per mil	% Modern Carbon		Conventional radiocarbon age
				pMC ± 1 $\sigma$ error	yrs BP	
OZX211	Sediment	BWIL2 5-5.5cm	-18.9 +/- 0.1	90.95 ± 0.22		760 ± 20
OZW504	Sediment	BWIL2 8-8.5cm	-20.5 +/- 0.2	85.28 ± 0.21		1,280 ± 20
OZW505	Sediment	BWIL2 9-9.5cm	-18.9 +/- 0.1	82.87 ± 0.33		1,510 ± 35
OZW506	Sediment	BWIL2 10-10.5cm	-18.6 +/- 0.1	80.64 ± 0.29		1,730 ± 30
OZW507	Sediment	BWIL2 11-11.5cm	-18.0 +/- 0.1	67.62 ± 0.32		3,145 ± 40
OZW508	Sediment	BWIL2 12-12.5cm	-18.8 +/- 0.1	65.14 ± 0.27		3,445 ± 35