Author Comment on Revisions and Additions to the Manuscript

Following discussion with co-authors, additional material will be incorporated into the revised manuscript to further document the chronological framework and planktonic foraminiferal SST reconstructions from the Emerald Basin record (OCE-326-30GGC). Specifically, we will include (i) a figure and table illustrating the age–depth model and associated uncertainties for core OCE-326-30GGC (comparable to current Fig. 2; see Fig. A and Table A), and (ii) incorporation of the OCE-326-30GGC *Neogloboquadrina pachyderma* relative abundances (%Np) and the corresponding assemblage-based SST reconstruction into the Results section (see Fig. B).

A brief description of the methods underlying the age model construction and the foraminiferal assemblage-based SST estimates will also be added to the Methods section. These additions are intended to improve transparency and provide context for data already used in the manuscript, but do not affect the main interpretations. Reviewers are invited to consider these forthcoming additions when evaluating the manuscript.

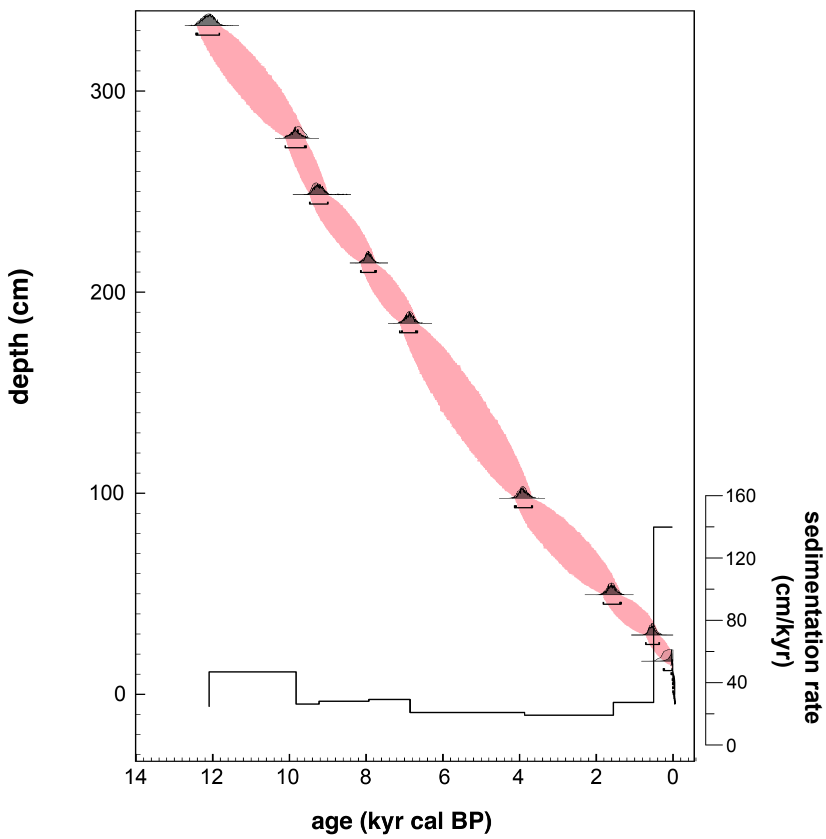

Figure A: Bayesian age–depth model for sediment core OCE-326-30GGC based on calibrated AMS ^{14}C dates. Black symbols indicate individual radiocarbon ages and supported by ^{210}Pb constraints in the uppermost core section. Black symbols indicate individual radiocarbon ages with 2σ uncertainties. The red shading represents the 95% confidence interval of the modelled age–depth relationship derived using OxCal. Sedimentation rates based on ^{14}C dates are shown in cm/kyr.

Table A: Radiocarbon chronology for core OCE-326-30GGC. Calibrated AMS ^{14}C ages (Marine20; ΔR = −123 ± 80 years) are shown with depth corrections applied for a 6 cm sediment void and a 4 cm GGC–MC offset. Grey shading denotes rejected dates (age reversals or samples affected by steep faunal gradients).

ID	Sample name/species	Raw depth (midpoint; cm)	Adjusted depth*	Combined offset depth**	14C age	1sigma error	Cal. age (∆R=-123±80) - Marine20	+1 sig	-1 sig	Reason for rejection	Reference
OS-27370	MPF	12.5	12.5	12.5	255	60	Modern				Keigwin et al., 2003
OS-27369	MPF	14.5	14.5	14.5	375	60	Modern				Keigwin et al., 2003
OS-27393	MPF	16.5	16.5	16.5	505	120	148	0	210		Keigwin et al., 2003
OS-27372	MPF	29.5	29.5	29.5	960	70	514	422	630		Keigwin et al., 2003
OS-25803	MPF	49.5	49.5	49.5	2040	60	1578	1439	1705		Keigwin et al., 2003
UCIAMS-215672	OCE326-30GGC 69-72cm planktics .15mgC	71.5	65.5	69.5	3575	25	3452	3333	3572	Located on steep conc. gradient	DT
OS-139035	MPF	99.5	93.5	97.5	3920	25	3888	3744	4019		Keigwin pers. comm.
UCIAMS-242940	OCE-326-1-30GGC_127-128cm_2.26mg	127.5	121.5	125.5	5460	30	5773	5657	5887	Located on steep conc. gradient	JW
UCIAMS-215673	OCE326-30GGC 131-132cm planktics .27mgC	131.5	125.5	129.5	5590	20	5919	5779	6031	Age reversal	DT
OS-139034	MPF	150.5	144.5	148.5	5530	25	5846	5724	5962	Located on steep conc. gradient	Keigwin pers. comm.
OS-45403	MPF	186.5	180.5	184.5	6440	35	6845	6717	6971		Sachs, 2007
OS-139036	MPF	216.5	210.5	214.5	7520	40	7919	7798	8023		Keigwin pers. comm.
OS-47996	MPF	250.5	244.5	248.5	8650	50	9259	9133	9399		Sachs, 2007
OS-134142	MPF	278.5	272.5	276.5	9060	25	9750	9586	9883		Keigwin pers. comm.
OS-45404	*Nonionella* spp.	334.5	328.5	332.5	10700	40	12082	11899	12261		Sachs, 2007

*To account for 6cm void between 18-24cm

**To account for 4cm GGC offset

The following sections will be added to 2. Material & Methods

2.1 Sediment Material (added to existing sub-chapter)

Giant gravity core OCE-326-30GGC (from herein, 30GGC) was retrieved during cruise 326 of the R/V Oceanus in July 1998 from Emerald Basin, an approximately 250 m deep depression on the Scotian Shelf (45°53.1003'N, 62°47.7009'W). Similar to MSM101_44-3, 30GGC was cut into 1.5 m sections, each of which was split lengthwise into archive and working halves before being stored at Woods Hole Oceanographic Institution, MA, USA. Core sampling was conducted iteratively in stages, guided by successive rounds of radiocarbon dating and preliminary faunal analyses under the supervision of Lloyd Keigwin. The analyses reported here are based on an average sampling resolution of approximately 1–2 cm for the upper 2 m of the core and 4 cm thereafter. Samples were freeze-dried and washed over a 63 µm sieve at University College London.

2.2. Chronology (added to existing sub-chapter)

The chronology for core 30GGC is derived from a combined age model incorporating both 30GGC and companion multicore OCE-326-MC29D (Keigwin et al., 2003), which were spliced using downcore faunal data. Eights published and three unpublished AMS 14C dates on mixed planktic foraminifera, supplemented by ^{210}Pb dating for the uppermost sediments (Keigwin *et al.,* 2003; Sachs, 2007; Thornalley *et al.,* 2018), were used to construct the model (Fig. X). Radiocarbon dates were calibrated in OxCal v4.4 (Bronk Ramsey, 2009) with the Marine20 dataset (Heaton *et al.,* 2020) and a local marine reservoir correction of ΔR = −123 ± 80 years (McNeely *et al.,* 2006). Four additional AMS dates were excluded due to either age reversals or their position within steep planktic foraminiferal abundance gradients, which increased susceptibility to bioturbation.

2.4 Faunal assemblage data

Foraminiferal faunal assemblage counts were performed on splits of the >150 µm sediment size fraction containing ~300 specimens using a Leica LED3000 light microscope at 40× magnification. The relative abundance of *Neogloboquadrina pachyderma* (% *Np*) was calculated as the proportion of *Np* relative to the total planktic foraminifera. Species identification followed standard taxonomic references (Bé, 1977), test slide photographs (Kohfeld & Fairbanks, 1996; Darling *et al.,* 2006; Eynaud *et al.,* 2009; Eynaud, 2011), and the web-based database *Endless Forams* (Hsiang *et al.,* 2019). Uncertainty in relative abundances was estimated using a binomial approach (Heslop et al., 2011). Quantitative SSTs were then derived from %Nps using the calibration of Kohfeld & Fairbanks (1996):

$$\text{SST (°C)} = 10.5 - (\%\, Np/15)$$

Although the precise depth habitat of *N. pachyderma* is somewhat uncertain (Jonkers, 2010; Pados & Spielhagen, 2014; Xiao *et al.,* 2014), it is generally a subsurface-dwelling species that calcifies between ~100 and 200 m depth (Simstich *et al.,* 2003). Therefore, SSTs inferred from % *Np* are likely more representative of subsurface temperatures rather than true sea-surface conditions.

The following results section will be added to the manuscript.

3.5 %Neogloboquadrina pachyderma

%Np-based temperatures at core 30GGC exhibit a modest decrease of <1 °C prior to ~7 cal ka BP, with no clear evidence of large-amplitude variability. Between ~7 and 4 cal ka BP, temperatures decline more markedly by ~2 °C, exhibiting more pronounced variability, before reversing into a gradual warming trend. This warming culminates in a rapid increase of ~1 °C during the Industrial Era, with temperatures reaching their highest values toward the core top.

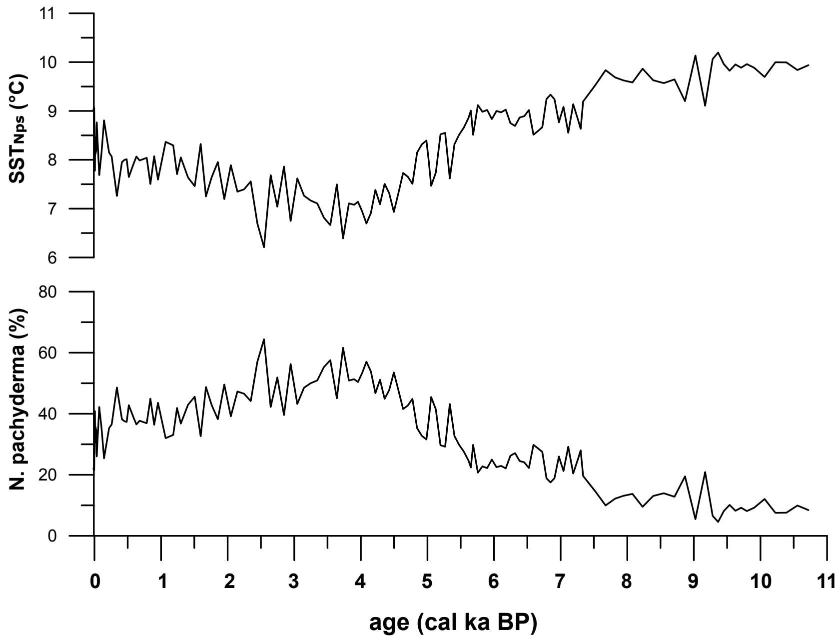

Figure B: Downcore record of *Neogloboquadrina pachyderma* relative abundance (in %) and corresponding assemblage-based SST (in °C) estimates from core OCE-326-30GGC (Emerald Basin, Scotian Shelf).