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Geophysical Research Letter

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Supporting Information for

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Precession-driven variations in the Indonesian Throughflow thermocline and its

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implications on the Agulhas Leakage

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Introduction

17

This file consists of four figures. Figure S1 shows the linear correlation of Fe/Ca, Al/Ca

18

and Mn/Ca with Mg/Ca. Figure S2 shows the proxy records from IODP Site U1483. Figure

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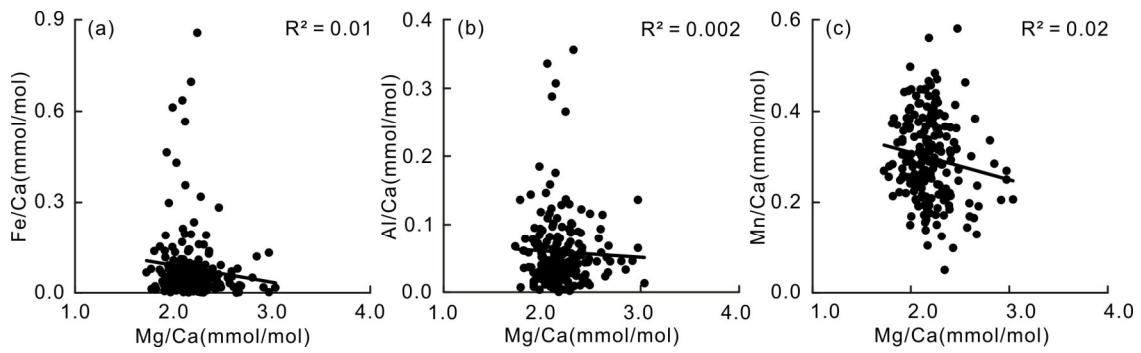
S3 presents spectra of various proxy records and their correlation and phase relationship

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on precession band. Figure S4 compares proxy records of thermocline temperature and

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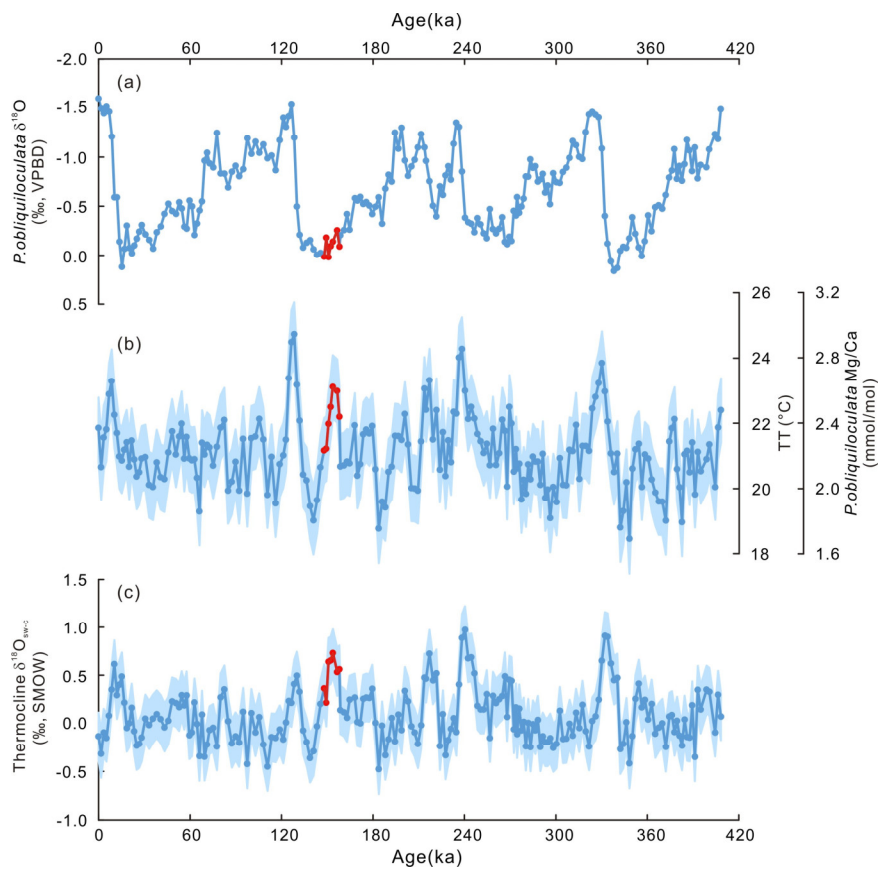
salinity between the Timor Sea and the South Atlantic.



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23 **Figure. S1** Linear correlation of Fe/Ca (a), Al/Ca (b) and Mn/Ca (c) with Mg/Ca.

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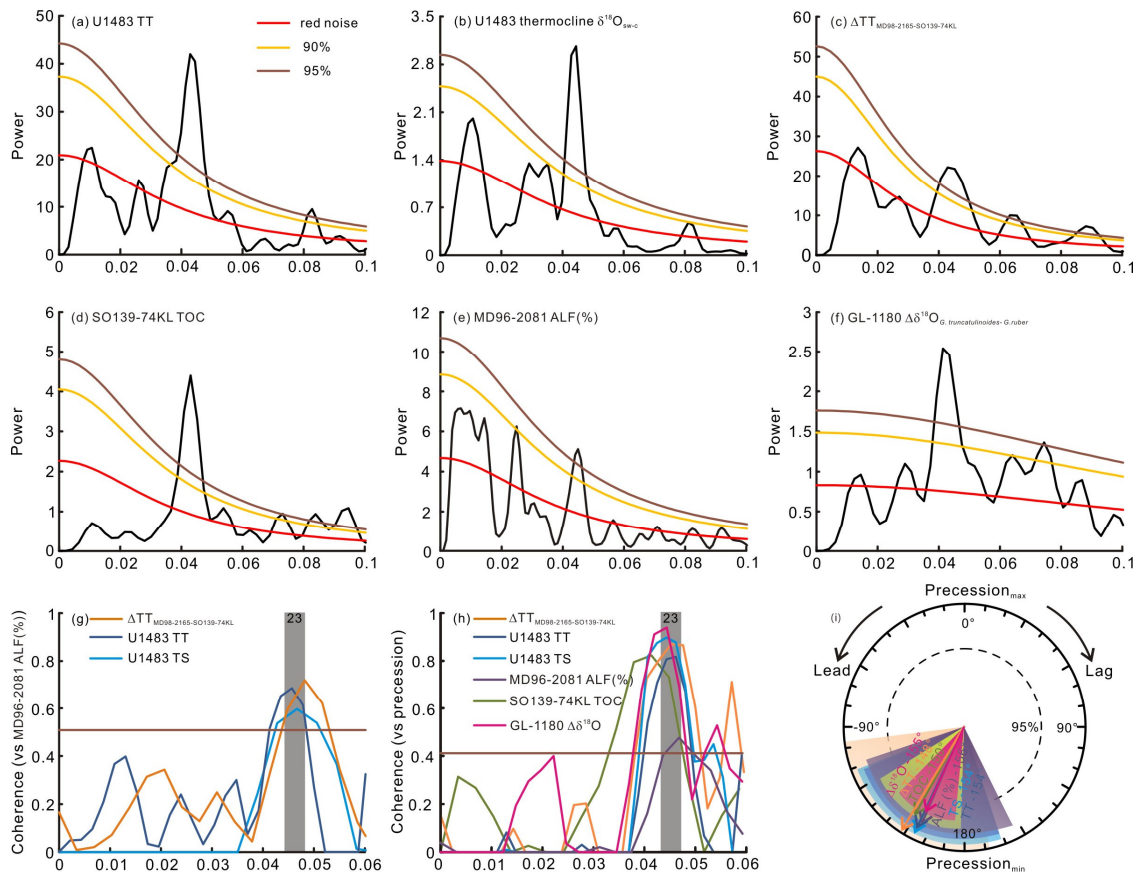
26 **Figure. S2** Proxy records from IODP Site U1483. (a) *P. obliquiloculata* $\delta^{18}\text{O}$; (b)

27 thermocline temperature (TT) calculated from *P. obliquiloculata* Mg/Ca; (c) local

28 thermocline seawater $\delta^{18}\text{O}$ ($\delta^{18}\text{O}_{\text{sw-c}}$) derived from *P. obliquiloculata* $\delta^{18}\text{O}$ and Mg/Ca-TT

29 and corrected for the effect of global ice volume. Envelopes in (b) and (c) denote the
 30 calculating uncertainties in thermocline temperature and $\delta^{18}\text{O}_{\text{sw-c}}$, which are $\sim 1.0^\circ\text{C}$ and
 31 $\sim 0.25\%$, respectively. The $\delta^{18}\text{O}$ and Mg/Ca data in the interval of 147.89-157.92 ka (red
 32 dots) are from Core MD01-2378 (this study), which was recovered at the same location
 33 and has the same age model as Site U1483. Inclusion of these data allows to bridge a
 34 depositional hiatus between 1401 cm (145.55 ka) and 1515 cm (158.59 ka) in the revised
 35 SPLICE of Site U1483.

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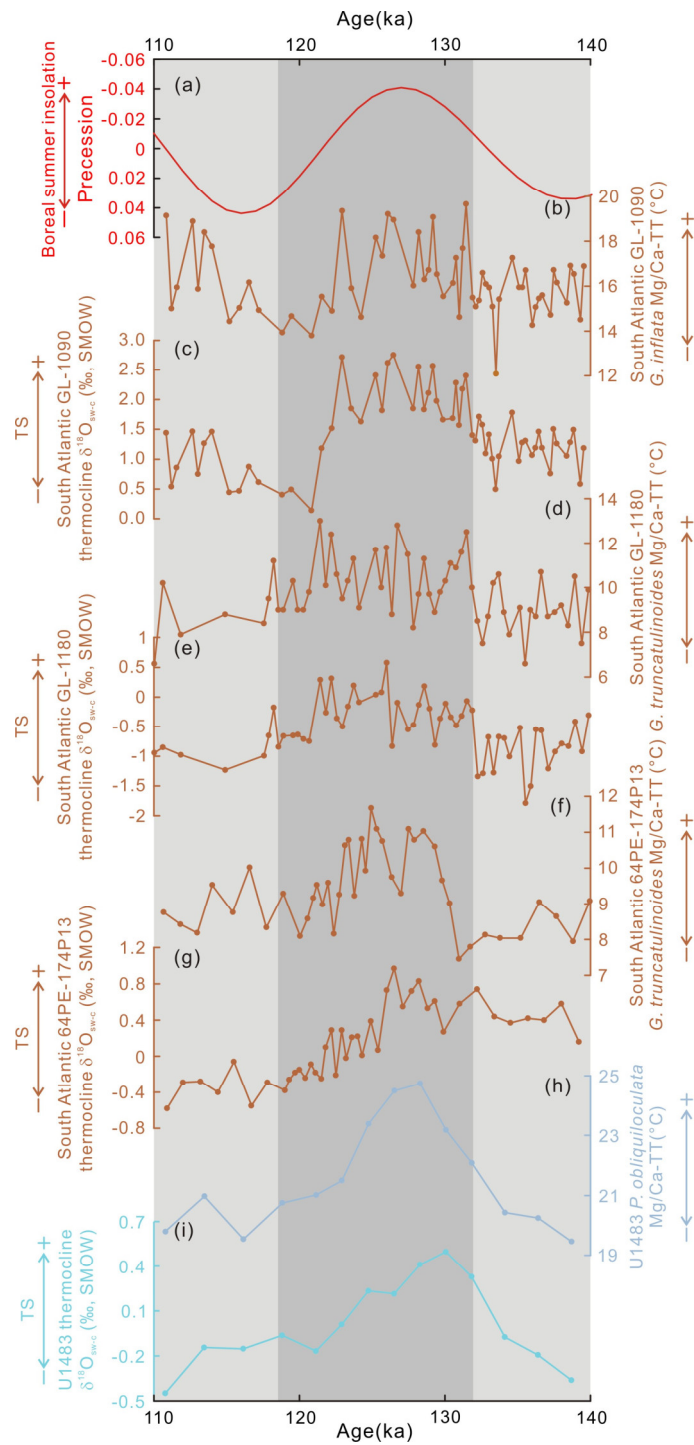


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38 **Figure. S3** Spectral and cross-spectral analyses of various proxy records in this study.

39 Spectral analysis of Site U1483 (a) thermocline temperature (TT) and (b) thermocline

40 $\delta^{18}\text{O}_{\text{sw-c}}$ (TS) ([this study](#)), (c) TT difference between Cores MD98-2165 and SO139-74KL
41 ($\Delta\text{TT}_{\text{MD98-2165-SO139-74KL}}$) ([Pang et al., 2021](#)), (d) total organic carbon (TOC) content of Core
42 SO139-74KL ([Lückge et al., 2009](#)), (e) relative abundance of Agulhas leakage fauna (ALF
43 (%)) from Core MD96-2081 ([Peeters et al., 2004](#)) and (f) $\delta^{18}\text{O}$ difference between *G.*
44 *truncatulinoides* and *G. ruber* ($\Delta\delta^{18}\text{O}_{G. truncatulinoides-G. ruber}$) of Core GL-1180 ([Nascimento et](#)
45 [al., 2021](#)). (g) Coherence of MD96-2081 ALF (%) with $\Delta\text{TT}_{\text{MD98-2165-SO139-74KL}}$ and U1483 TT
46 and TS based on cross-spectral analysis. (h) Coherence of precession with $\Delta\text{TT}_{\text{MD98-2165-}}$
47 SO139-74KL , U1483 TT and TS, MD96-2081 ALF (%), SO139-74KL TOC and GL-1180 $\Delta\delta^{18}\text{O}_{G.}$
48 *truncatulinoides-G. ruber*, respectively. (i) Phase wheel showing the phase relationships of $\Delta\text{TT}_{\text{MD98-}}$
49 2165-SO139-74KL , U1483 TT and TS, MD96-2081 ALF (%), SO139-74KL TOC and GL-1180
50 $\Delta\delta^{18}\text{O}_{G. truncatulinoides-G. ruber}$ with precession. Spectral and cross-spectral analyses were
51 respectively performed by REDFIT ([Schulz and Mudelsee, 2002](#)) and Redfit-X ([Ólafsdóttir](#)
52 [et al., 2016](#)) with a rectangular window.



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54 **Figure. S4** Comparison of thermocline temperature (TT) and salinity (TS) between the
 55 Timor Sea and the South Atlantic. The Timor Sea Site U1483 is from this study. The South
 56 Atlantic Cores GL-1090, GL-1180 and 64PE-174P13 are from [Ballalai et al. \(2019\)](#),

57 [Nascimento et al. \(2021\)](#) and [Scussolini et al. \(2015\)](#), respectively. Precessional parameter

58 is from [Berger and Loutre \(1991\)](#).