

Figure S1: Depth profiles of present-day annual temperature (gray line and open symbols) at 17.5°N 77.5°W (LEVITUS, 1994). Surface and subsurface water masses flowing at the core site are also reported. Gray and shaded areas: living depths of coccolithophorids (Kameo et al., 2004) and of planktonic foraminifera *Globigerinoides ruber* (Schmuker and Schiebel, 2002), respectively.

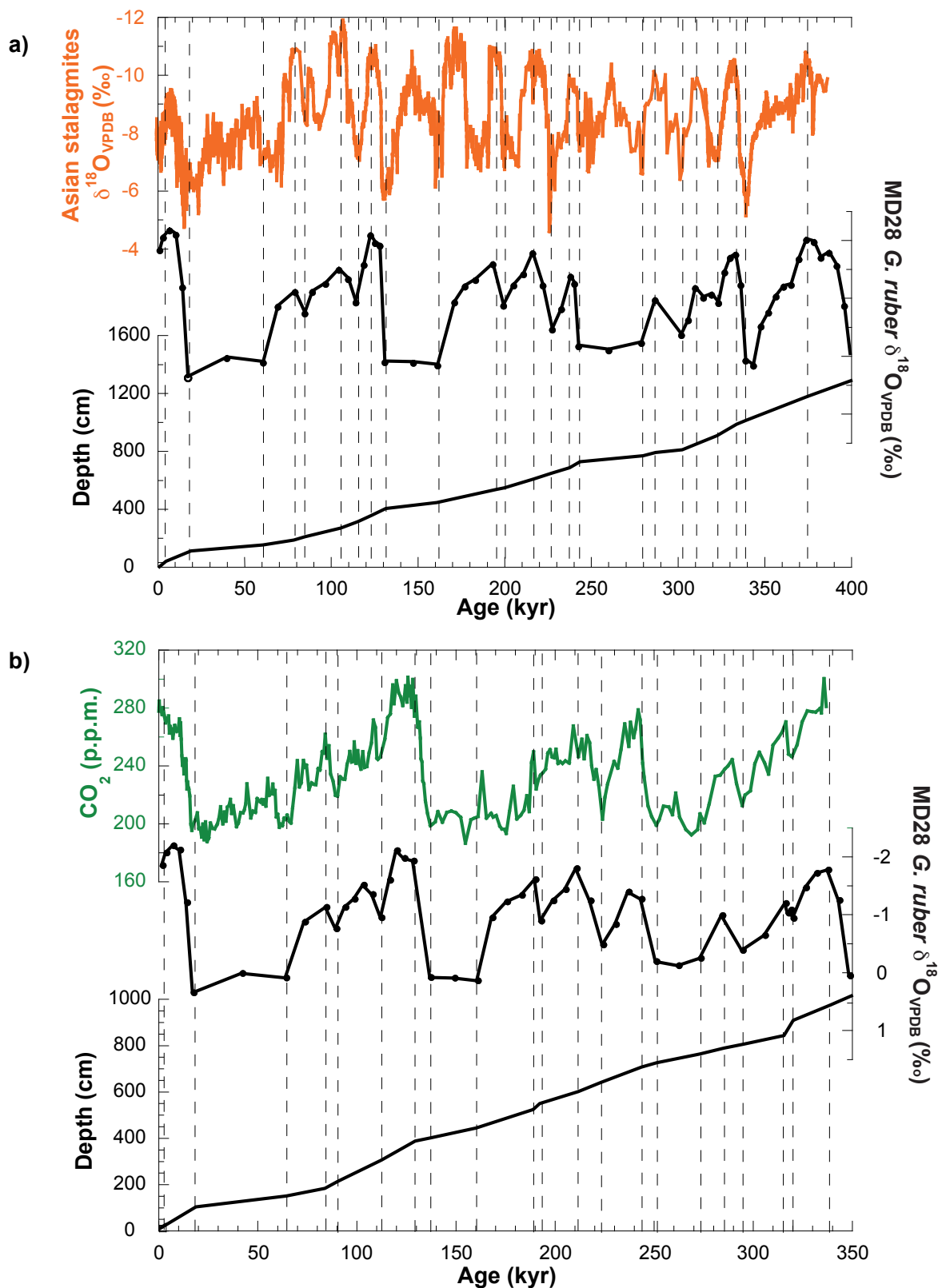
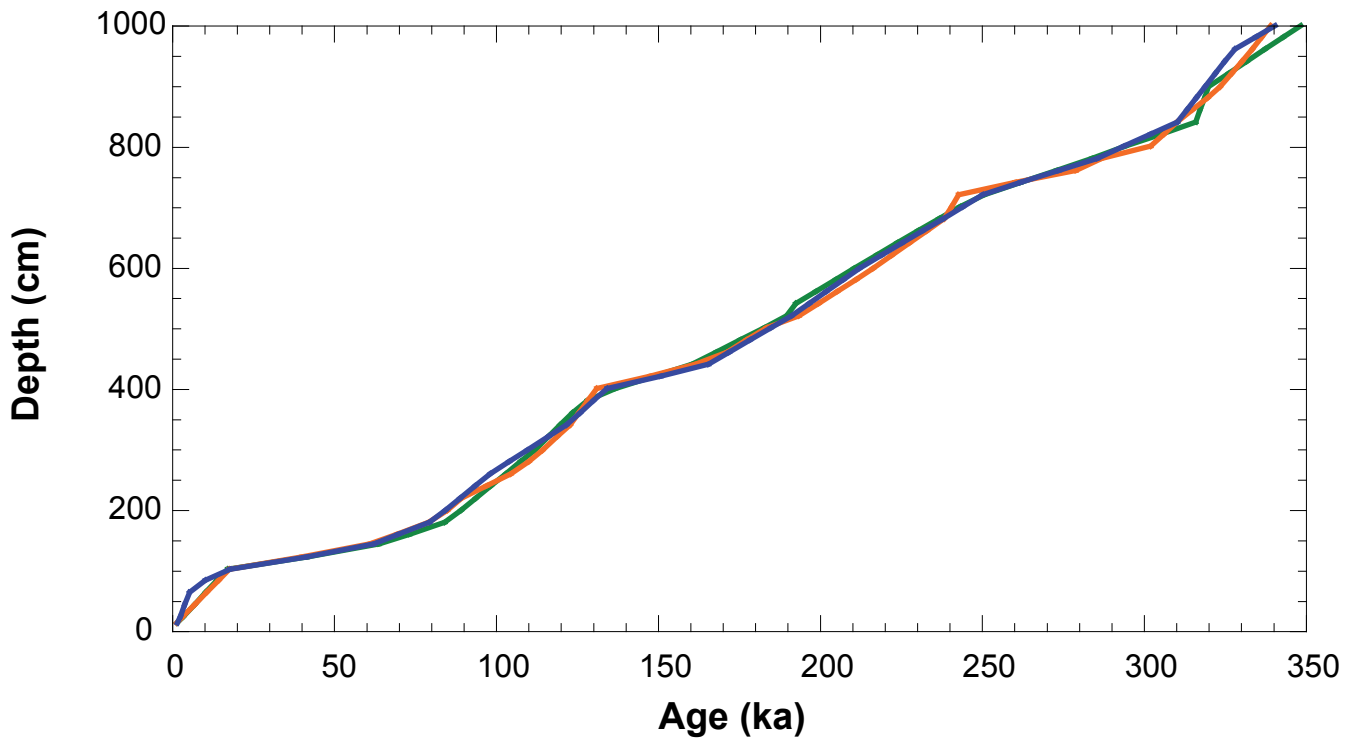


Figure S2: The chronological framework of core MD03-2628 for the last 350 ka based on two different reference records. a) The chronology based on the composite $\delta^{18}\text{O}$ record of Asian stalagmites dated by Uranium-Thorium as compiled by Cheng et al. (2009) used for isotopic stratigraphy (orange curve), the *Globigerinoides ruber* $\delta^{18}\text{O}$ record of core MD03-2628 (black curve and full circles) and the age versus depth relationship of core MD03-2628 (black bold line). b) The chronology based on the Antarctic CO_2 record with the Kawamura et al. (2007) chronology based on the O_2/N_2 ratio used for isotopic stratigraphy (green curve), the *Globigerinoides ruber* $\delta^{18}\text{O}$ record of core MD03-2628 (black curve and full circles) and the age versus depth relationship of core MD03-2628 (black bold line). Black dashed lines in a) and b) indicate the correlation pointers established with the Analyseries software (Paillard et al., 1996). Figure S2 can be compared with the published chronology of core MD03-2628 in Sepulcre et al. (2009).



Age model from Sepulcre et al. (2009)

**Age model based on Asian stalagmite $\delta^{18}\text{O}$ records
U/Th-dated from Cheng et al. (2009)**

**Age model based on Antarctic CO_2
with Kawamura et al. (2007) chronology**

Figure S3: The age *versus* depth relationship of core MD03-2628 based on different chronologies that are displayed as i) the original published chronology from Sepulcre et al. (2009) (blue curve), ii) the age model based on the composite $\delta^{18}\text{O}$ record of Asian stalagmites dated by Uranium-Thorium compiled by Cheng et al. (2009) (orange curve) and iii) the chronology based on the Antarctic CO_2 record with the Kawamura et al. (2007) age model (green curve).

Table 1: Replicate $\delta^{18}\text{O}$ measurements on *Globigerinoides ruber*

Depth (cm)	Age (kyr)	$\delta^{18}\text{O}$ (‰) VPDB	$\Delta\delta^{18}\text{O}$ (‰) VPDB
10.5	2.2	-2.037	0.097
		-2.134	
15.5	2.7	-1.824	0.109
		-1.934	
80.5	10.4	-1.087	0.098
		-1.185	
377.5	130.9	-1.901	0.003
		-1.898	
383.5	132.7	-0.837	0.026
		-0.863	
389.5	134.5	-0.447	0.035
		-0.413	