

Table S1 Full list of all measured conventional and calibrated radiocarbon ages and full description of Ramped Pyrolysis Oxidation (RPO).

Core Nr./ position	Depth (cmbsf)	Carbonate source	Conventional radiocarbon ages (¹⁴ C ka BP) +- error	Marine20 calibration Age range (cal ka BP) 2 sigma rounded	Median (cal ka BP) rounded
PS128_44-1/Outer shelf NB	6	Benthic foraminifers	1,583 +-71	772 - 1,172	1,000
	106	Benthic foraminifers	14,095 +-142	14,806 - 15,665	15,200
	147	Benthic foraminifers	14,356 +-149	15,133 - 16,010	15,600
PS128_46-1/Outer shelf IA	192	Benthic foraminifers	11,625 +-135	11,730 - 12,563	12,200
	220	Benthic foraminifers	11,629+-116	11,761 - 12,514	12,200
	228	Benthic foraminifers	11,606 +-106	11,764 - 12,475	12,100
	243	Benthic foraminifers	12,487 +-111	12,783 - 13,307	13,000

Ramped-Pyrolysis-Oxidation (RPO) ¹⁴C ages were determined using a modified SoliTOC Cube Carbon Analyzer (Elementar Analysensysteme GmbH, Germany) located at the radiocarbon dating facility of the Alfred Wegener Institute (AWI) in Bremerhaven. 100 mg of ground, freeze-dried sediment was weighted into pre-combusted (6h at 900°C) ceramic crucibles, acidified with 3 drops of 0.5 M HCl and placed on a heating plate at 60°C for 1h to remove inorganic carbon. This procedure was repeated two more times and the sediment was allowed to dry completely before analysis. RPO was conducted in pyrolysis mode (oxygen-free conditions) with a heating rate of 15°C/min. Based on the shape of the thermograms (evolved CO₂ over temperature) the temperature limit for an appropriate fraction was determined such that the upper temperature limit was as low as possible while including a total amount of 80-100 µgC. For the trapping run, an appropriate amount of sediment was weighted in, prepared and analysed as described above. During this second run, all CO₂ produced between the onset of the heating phase and 290°C was collected on a self-constructed zeolite trap system and subsequently ¹⁴C-analysed using AWI's Mini C ARbon DAting System (MICADAS 15; Ionplus AG, Switzerland) applying the standard gas measurement method. The data were blank corrected against blank and modern CO₂ reference gases (Rosenheim et al.2008; Mollenhauer et al., 2021).

Mollenhauer, G., Grotheer, H., Gentz, T., Bonk, E., and Hefter, J.: Standard operation procedures and performance of the MICADAS radiocarbon laboratory at Alfred Wegener Institute (AWI), Germany, Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms, 496, 45–51, <https://doi.org/10.1016/j.nimb.2021.03.016>, 2021.

Rosenheim, B. E., Day, M. B., Domack, E., Schrum, H., Benthien, A., and Hayes, J. M.: Antarctic sediment chronology by programmed-temperature pyrolysis: Methodology and data treatment, Geochem Geophys Geosyst, 9, 2007GC001816, <https://doi.org/10.1029/2007GC001816>, 2008.