

Timing of shell size increase of the foraminifer *N. pachyderma* (s) in the Pleistocene, IODP Site U1304, the North Atlantic Ocean

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High latitude boreal seas are characterized by the extraordinary abundance of the planktic foraminifer *Neogloboquadrina pachyderma* (sinistral). Shell size of this species has recently been reported to have increased through the Quaternary in northern hemisphere oceans. Kucera and Kennett (2002) found such trend in the North Pacific and claimed that the modern type of the species had appeared about 1 Ma. Generally, the shell size of foraminifera is believed to have increased during the Cenozoic, and maximized in the most favorable conditions (Schmidt et al., 2004). In the case of *N. pachyderma* (sin), Huber et al. (2000) suggested that such an increase in shell size would reflect their evolutionary adaptation when cold waters progressively appeared in the high latitudinal seas together with increasing glaciation since the mid-Quaternary. However, most of these previous works have targeted upper Pleistocene and Holocene (1.3-0 Ma) deposits off California and the Norwegian - Greenland Sea. In both regions *N. pachyderma* (sin) is not frequent but rather of sporadic occurrence during the early Pleistocene. Here we describe the long-term trend in shell size change of *N. pachyderma* (sin) from its main habitat, and to investigate the detailed timing of size increase using qualified core materials covering of the whole Quaternary period in the subarctic North Atlantic. Utilizing samples from IODP Exp. 303 Site U1304 in the North Atlantic, we found that mean and maximum shell sizes of a population began to increase around 1.1 Ma, and that several episodic changes in test size occurred during 0.6-0.35 Ma. Test size reached a maximum during the late Quaternary. Based on correlation with previous investigations, we have confirmed that these changes in foraminiferal shell size occurred on an inter-ocean scale.