

## Periodic production of NPIW may have prevented upwelling of old deepwater in the N. Pacific during the last deglaciation

Ryuji Tada<sup>1\*</sup>, Rella Stephan<sup>1</sup>, Masao Uchida<sup>2</sup>, Takuya Itaki<sup>3</sup>, Kana Nagashima<sup>4</sup>, Naomi Harada<sup>4</sup>

<sup>1</sup>Grad. School of Sci., Univ. of Tokyo, <sup>2</sup>NIES-TERRA, <sup>3</sup>Geological Survey of Japan, <sup>4</sup>RIGC, JAMSTEC

The hemipelagic sediments in the northwestern Pacific margin including the Bering Slope are characterized by the occurrence of two distinct organic-rich, laminated intervals during the last deglaciation. These laminated intervals are considered as corresponding to Bolling/Allorod (B/A) and Preboreal (PB) warm periods, respectively. The core MR06-04-PC-23 retrieved from the northwestern part of the Bering Slope at the water depth of 1002 m also has these two laminated intervals. The lower laminated interval is subdivided into four laminated sub-intervals characterized by increased amount of CaCO<sub>3</sub> and/or opal. Thickness ratios of these four laminated subintervals are very similar to those of warm intervals recorded in NGRIP ice core during B/A, suggesting deposition of the laminated subintervals and negative shifts in oxygen isotope ratio of NGRIP core were synchronous. Whereas, calendar ages for the laminated intervals estimated from <sup>14</sup>C dates with assumed reservoir age of 780 yrs are consistently older by 200 to 400 yrs than the ages estimated from NGRIP age model, suggesting larger reservoir age during B/A and PB periods. This observation is consistent with the idea that old and oxygen-poor deepwater upwelled in the Bering Sea during B/A and PB periods. These laminated subintervals are also characterized by the decreases in abundance of *Cycladophora davisiana*, an indicator of the North Pacific Intermediate Water (NPIW), especially in their lower parts. We consider that formation of NPIW played an important role on interrupting the upwelling of old and nutrient-rich deepwater and reduced surface productivity in the north Pacific during cold periods such as Heinrich-1 and YD events whereas reduction of NPIW formation during B/A and PB warm periods allowed upwelling of old and nutrient-rich deepwater and enhanced surface productivity. It is also worth noting that oxygen and carbon isotope ratios of benthic foraminifera (*Uvigerina akitaensis* and *Buliminella tenuata*) in PC-23 shows relatively rapid decreases that precede deposition of the lower laminated interval by ca. 700 yrs. This suggests that old and oxygen-poor deep water already started prevailing in the intermediate water depth of north Pacific before the onset of Bolling period.

Keywords: deglaciation, Bering Sea, NPIW, Bolling/Allorod, Younger Dryas