

## Seasonal reconstructions by multi-planktonic foraminiferal $d^{13}C$ and $d^{18}O$ approaches in the Bering Sea during last 18,000 yrs

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Seasonal variation of the Bering Sea during last 18,000 years has been investigated by stable carbon and oxygen isotope record of two different planktonic foraminifers (*Neogloboquadrina pachyderma* and *Globigerina umbilicata*) in a piston core obtained at the Bowers Ridge (BOW-9A: 54 degree 02.23 N, 178 degree 40.58 E, 2391m water depth).

The oxygen isotope records of both two taxa showed fairly syntonous to the global climate changes recorded in the Greenland Ice Core. Their most distinguished difference occurred during the period of ice melting (e.g. 15,000 to 14,000 yrs B.P. and 13,000 to 11,000 yrs B.P.). During this period, oxygen isotope ratio of *G. umbilicata* significantly dropped approximately 1.6 permil VPDB, whereas that of *N. pachyderma* only decreased around 0.7 permil VPDB. By concerning their seasonal successions in the present Bering Sea these notable differences were considered as the evidence of seasonal ice melting during fall season. This period corresponded to pronounced  $CaCO_3$  contents peaks, which has been recognized as the event deduced by ice-melting in the high latitude of marginal seas (including Okhotsk Sea and Bering Sea) in the Northern Pacific.

Unlike oxygen isotope records, significantly different pattern was recognized for carbon isotope record in each taxon. While carbon isotope records of *N. pachyderma* represented quite high negative correlation to its oxygen isotopes ( $r = -0.91$ ), that of *G. umbilicata* showed intriguing changes in reversal relations after preboreal era. From the last glacial to the preboreal period, carbon isotope records of *G. umbilicata* negatively correlated ( $r = -0.73$ ) to that of oxygen isotopes. After that period, their relation seemed to be reversed. This unique reversal trend has possibility of represent in ocean circulation and vertical mixings during fall seasons.