

IODP研究

北冰洋西部晚第四纪浮游有孔虫氧碳同位素记录的海冰形成速率

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摘要:

北冰洋西部晚第四纪浮游有孔虫 *Neogloboquadrina pachyderma* (sin.) (Nps)壳体的 $\delta^{18}O$ 和 $\delta^{13}C$ 与浮游有孔虫丰度和筏冰碎屑含量的综合研究表明, MIS 7晚期以来, Nps的 $\delta^{18}O$ 和 $\delta^{13}C$ 值出现7次明显的偏轻, 可能与海冰形成速率的提高造成轻同位素卤水的生产和下沉相关。偏轻的Nps $\delta^{18}O$ 和 $\delta^{13}C$ 值对应于极低的浮游有孔虫丰度和筏冰碎屑含量, 因此这些轻值与温暖的大西洋水和淡水的输入无关, 应当指示进入北冰洋的大西洋水减弱和楚科奇海陆架水的大量减少。相反, Nps $\delta^{18}O$ 的重值则反映输入北冰洋的淡水和太平洋水的减少;Nps $\delta^{13}C$ 的重值指示来自陆架流通性更好的表层和盐跃层水向北冰洋的输送。

关键词: *Neogloboquadrina pachyderma* (sin.); $\delta^{18}O$ 和 $\delta^{13}C$ 轻值;海冰形成速率;晚第四纪;北冰洋西部

Sea Ice Formation Rates Recorded in Planktonic Foraminiferal Oxygen and Carbon Isotopes in the Western Arctic Ocean during the Late Quaternary

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Abstract:

An integrated study was carried out on stable isotopes of planktonic foraminifera *Neogloboquadrina pachyderma* (sin.) (Nps), planktonic foraminiferal abundance and ice rafted detritus (IRD) in the western Arctic Ocean to investigate sea ice formation during the late Quaternary. Our results show that light excursions in Nps $\delta^{18}O$ and $\delta^{13}C$ happened seven times, likely indicating the production and sinking of isotopically light brines caused by enhanced rate of the sea ice formation. Because concomitant decrease occurred in planktonic foraminiferal abundance and IRD, these light Nps $\delta^{18}O$ and $\delta^{13}C$ values unlikely reflect inputs of freshwater and warm Atlantic waters. They more likely suggest reduction of Atlantic waters into the Arctic Ocean and substantial decrease of Chukchi Sea shelf waters. On the contrary, heavy $\delta^{18}O$ values would indicate reduction of freshwater and Pacific waters into the Arctic Ocean and heavy $\delta^{13}C$ values be caused by well ventilated surface and halocline waters transported from the shelf into the Arctic Ocean.

Keywords: *Neogloboquadrina pachyderma* (sin.) Light $\delta^{18}O$ and $\delta^{13}C$ excursions Rate of sea ice formation Late Quaternary Western Arctic.

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