Regional/temporal phase shift of orbital scale Mass accumulation Rate along the Glacial-Interglacial cycles in the Gulf of Alaska (IODP Exp. 341) around 1.0 Ma.

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Temporal variations of erosional effluxes at the orogenic belts along the Glacial Interglacial (G-IG) cycles bring beneficial insight. Concerning the major sediment delivery system nearby the ice margin, maxima of erosional effluxes are concerned to be occurred via: (a) ice melting during warm era (i.e. Interglacial maxima) or (b) continental carvings in association with Ice growth on land during cold era (i.e. Glacial Maxima). Reflecting such scenarios, marked erosional increase reflecting longer duration of glacial period after Mid Pleistocene Transition (MPT; 1.2-0.8Ma) in the Gulf of Alaska (IODP Exp. 341). Even though temporal changes of erosional effluxes at orbital scale (Glacial Interglacial cycles) are still not clearly defined. Here we present orbital scale oxygen isotope stratigraphy age model of IODP Exp. 341 (U1417: 56.06N, 147W, and U1418: 58N, 144.5W). Together with orbital-scale temporal variations of Mass Accumulation Rate (MAR), we challenge to identify phase difference of MAR to G-IG cycles back to 1.0 Ma. Common presences of arctic planktic foraminifers (*N. pachyderma*) at both sites, permits establishing fairly reasonable oxygen isotope stratigraphy with help of ship-board magneto and bio stratigraphy. Approximately seven times higher sedimentation rate (SR) at sea-ice proximal site U1418 (average SR: 82 cm / kyr) compared to that at U1417 (average SR: 11 cm / kyr) suggests large sediment discharge to Surveyor Fan from the continental margin of Alaska. While SR at U1417 show clear increasing trend after MPT as previously witnessed, that at U1418, which is closer to continental ice margin, did not show clear increasing indication as expected. Reconstructed MAR at both sites indicate statistically confirmed coherent trend along the G-IG cycle. However, their phase to G-IG cycle are different at time domain. Prior to 0.6 Ma, MAR at both sites is in phase to G-IG cycle, meaning MAR maxima tends to appear at Interglacial peaks (warm era). After 0.6 Ma, whilst that at U1417 remains same “in-phase” relations to G-IG cycle, phase of that at U1418 to G-IG cycle is shifted to “half phase”, indicating MAR peak at U1418 tends to appear at transitions between glacial and interglacial peaks. Observed regional contrast of MAR at U1417 and U1418 suggest that the onset timing of erosional increase is 0.6 Ma. Since 100 kyr cyclicity of G-IG cycle became relevant after 0.6Ma, our finding supports the idea of precious study that erosion reinforcing along with longer duration of Glacier period.

Keywords: Gulf of Alaska, Oxygen isotope stratigraphy, Glacial Interflacial cycle

