

Preliminary results from shipboard research during IODP Expedition 341 (Alaska Tectonics, Climate and Sedimentation)

SUTO, Itsuki^{1*} ; ASAHI, Hirofumi² ; FUKUMURA, Akemi³ ; KIOKA, Arata⁴ ; KONNO, Susumu⁵ ; MATSUZAKI, Kenji⁶ ; NAKAMURA, Atsunori⁴ ; OJIMA, Takanori⁷ ; EXPEDITION, 341 scientists⁸

¹Nagoya Univ., ²Pusan National Univ., ³Hokkaido Univ., ⁴Univ. of Tokyo, ⁵Kyushu Univ., ⁶Tohoku Univ., ⁷Univ. of Tokyo, ⁸(none)

The North American Cordillera is an active orogen, which in the Pleistocene is, at times, covered by the Cordilleran Ice Sheet. Ice sheet dynamics are likely impacted by global climate and likely enhanced the erosion in the Cordillera. The melt water discharge to the ocean may play an important role in the rich ecosystem in the Gulf of Alaska by delivering nutrients. In the modern Gulf of Alaska, a rich diversity of marine microorganisms is associated with the seasonal nutrient supply derived from glacial melt water. Continuous paleoceanographic reconstruction by marine microfossils (radiolarians, diatoms, foraminifers etc.) can provide the history of the nutrient supply that may be associated with ice sheet dynamics and glacial runoff into the Gulf of Alaska.

Since the late Miocene, ice sheets formed on the North American continent and intensified around 2.5 Ma during Northern Hemisphere glaciation, which had a strong impact on global and regional environments. On the other hand, the large ice sheet may also have enhanced the erosion process in the higher latitudes and supplied terrigenous inputs such as glacial sediments to the coastal zone. Therefore, it is expected that the sediments in the Gulf of Alaska have recorded directly the history of the Cordillera ice sheet formation and erosion process since the Neogene. In this background, the Integrated Ocean Drilling Program (IODP) Expedition 341 held between May to July 2013, targeted this high-resolution sediment record from late Cenozoic in order to investigate the relevance of climate change in the North Pacific Ocean and the erosion process of Cordilleran glaciers. The drilling was conducted from deep-sea fan to continental shelf occupied by glaciers during glacial expanses.

According to preliminary ship-board results, the sediments recovered during this expedition record paleoceanographic changes in the Gulf of Alaska since the late Miocene and extremely high sedimentation rates which could be one of the greatest achievements in this expedition. In addition, microscopic observation, organic and inorganic chemical analysis and measurement of the physical properties suggest that a large amount of the terrestrial sediments have been transported. A large amount of glacial sediments (ice-rafted debris) have been also recorded. Although it was expected that calcareous microfossils are poorly preserved in this area, the sediment samples obtained in this cruise contained a continuous and rich foraminifera record which will allow the establishment of a long continuous oxygen isotopic curve. Siliceous microfossil and p-mag analyses enable the building of firm chronostratigraphy when combined with the oxygen isotopic curve. Under this well-constrained age determination, other chemical/physical/biological investigations will be done and then we will clarify the paleoenvironmental fluctuation that is unprecedented in the North Pacific.

Keywords: IODP Exp. 341, Gulf of Alaska, land/ocean paleoenvironment, Glacier