Strong typhoon in 2005 recorded in the shell growth lines and geochemical signals of *T. maxima* from Okinotori Island

KOMAGOGE, Taro¹; WATANABE, Tsuyoshi¹; MIYAJI, Tsuzumi²; SHIRAI, Kotaro³; YAMAZAKI, Atsuko³

¹Department of Natural History, Graduate School of Science, Hokkaido Univ., Sapporo, Japan, ²Tomakomai City Museum, Tomakomai, Japan, ³Atmosphere and Ocean Research Institute, The University of Tokyo, Kashiwa, Japan

The giant clam (*Tridacnidae*) widely distributes over the coral reefs in Indo-Pacifc oceans and forms the largest shells in bivalves. The giant clam has symbiotic algae, facilitating fast growth rate and forming daily shell growth patterns. By measuring and counting the daily growth lines, we can know exactly when the daily growth lines were deposited. This growth pattern analysis is useful for reconstruction of the past environments at daily resolution. The aim of this study was to validate whether the shell of the giant clam (*Tridacna maxima*) in Okinotori Island, the southern edge island in Japan, could record daily environmental events such as typhoons.

The shell samples were collected alive in Okinotori Island on 5th Jun 2006. The shells were cut into two slices along the maximum growth axis. The number and interval width of microgrowth lines were measured under a digital microscope (KYENCE VHX-2000). Sub-sampling for oxygen stable isotope measurements were performed along the growth direction on another slice of the shell by using dental drill. The powder samples were introduced to carbonate preparation device (Kiel Device IV), and the produced CO₂ was analyzed by a stable isotope ratio mass spectrometer (Thermo Scientific MAT253). Stable oxygen isotope ratios (δ¹⁸O) were compared with sea surface temperature (SST) and maxima values were assigned the lowest SST in February. The correspondence between reconstructed SST and daily observed SST indicated that the microgrowth lines were formed daily basis. Growth disturbances were observed as v-shaped breaks in the shell outer layers. The high δ¹⁸O peaks corresponded with these growth disturbances suggested that this specimen recorded the strong typhoon in Okinotori Island on 3th September 2005. Trace element analysis using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) (Agilent 7700) with 100µm and 30µm spots (Mg, Ca, Mn, Sr, Ba) revealed that the specimen has Ba/Ca positive peaks as an after-signature of strong typhoons. Moreover, the significant positive peaks observed in Ba/Ca profile suggested the upwelling events due to typhoons in Okinotori Island.

These results indicated that sclerochronological and geochemical record in giant clam shells could be useful for reconstruction of past typhoon events.

Keywords: Giant clam, Oxygen isotope, Carbon isotope, Trace elements, Growth line