

## Microfocus X-ray Computing Tomography Technique: Applications for the Ocean Acidification study

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The reduction of the oceanic pH (so-called ocean acidification (OA)) is one of the most concerning issues of recent oceanic environmental changes. Recent observation and culture studies indicate that calcification rates of ocean calcifiers (corals, pteropods, foraminifera, coccolithophores etc) which build external skeletons of calcium carbonates (CaCO<sub>3</sub>) will decrease and carbonate dissolution rates increase as CaCO<sub>3</sub> saturation states of seawater (Omega). However its affections for marine calcifiers in the nature are still largely unknown. It is needed to be quantified such affections to understand marine ecosystems and predict the future environmental conditions.

Here we proposed a new method to evaluate shell density of marine calcifiers by using the Micro-focus X-ray Computing tomography (MXCT) technique. The MXCT has great potential to bring new information for morphometric analysis of biology by the innovating data acquisition. It can get precise transparent tomographic images of individual specimen with spatial resolution in submicron scales. At the same time, MXCT has become possible to achieve the information about shell density quantitatively. Shell density analysis of marine zooplankton measured by MXCT is most accurate and objective compared with any other existing methods (e.g. SEM observations and weight loss etc). This method is applicable to not only living species but also fossil species, therefore it might provide novel information about the OA ongoing in the modern ocean and occurred in the past. We will introduce about the MXCT technique and its latest results in application for our OA research in the North Pacific and the Arctic Ocean.

Keywords: Microfocus X-ray CT, Planktic Foraminifera, Pteropod, North Pacific, Arctic Ocean, Ocean Acidification