

Observation of conodont fossils in siliceous sedimentary rocks within accretionary complexes using X-ray microscopes

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Conodonts are widely used as age diagnostic fossils. In studies of pelagic siliceous sedimentary rocks within accretionary complexes conodonts play a pivotal role in correlation with strata from other palaeogeographical areas. However, conodonts are generally scarce in these siliceous sedimentary rocks, making biostratigraphic studies difficult. In addition, the extraction of conodonts from these rocks require time-consuming processions using highly toxic chemicals (hydrofluoric acid).

In this study, we present a novel method of observing conodont fossils within the siliceous sedimentary rocks using laboratory-based X-ray microscopes. The method involves trimming of rock samples hosting conodonts, treatment of the sample surface with concrete mortar to avoid artefacts from refraction of X-rays at the surface interfering with the image of the fossils and reconstruction of 3D images using Amira software (Thermo Fisher Scientific). While the images obtained by this method has lower resolutions compared with scanning electron microscopes (SEMs), the quality is generally high enough for specific identification of conodonts.

Our method enables researchers to observe and identify physically and/or chemically damaged specimens that are impossible to extract by chemical dissolution methods. The use of laboratory-based X-ray microscopes is more suited to observing large quantities of specimens compared to methods using synchrotron facilities, which are less accessible. The use of our method would greatly increase the number of identifiable conodont fossils from pelagic siliceous rocks in accretionary complexes.

Keywords: microfocus X-ray computed tomography, conodont biostratigraphy, chert