X-ray microtomography as a tool to present and discuss new taxa: the example of *Risananeiza* sp. from the late Chattian of Porto Badisco.

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INTRODUCTION

In many earth science studies, especially in palaeontology, examination and/or measurement of internal features of samples are routinely requested.

X-ray computed tomography (CT) is for such tasks very well suited (CARLSON et alii, 2003). A variety of different X-ray CT instruments and techniques are now available: they can scan objects of a size range from less than one millimeter, to many decimeters and they can scan at different resolutions: from less than one micron (nanoCT) to one or a few microns (microCT), and up to the millimeters range (CT). The best-known advantage of X-ray CT is its ability to reconstruct quickly and non-destructively the interior of opaque solid objects in three dimensions when the density contrast is high enough to let the X-ray differentiate the internal features (NEUES & EPPLE, 2008; METSCHER, 2009). The computed tomography is thus a powerful tool for biometric study as the obtained scans are scaled according to the reported voxel size and therefore suited for linear and volumetric measurements (SPEIJER et alii, 2008; BRIGUGLIO et alii, 2011; GÖRÖG et alii, 2012; HOHENEGGER & BRIGUGLIO, 2012).

For many fossils, the X-ray CT may be the only practical means of gaining information on internal materials and geometries or other features hidden from external view (e.g., SPEIJER *et alii*, 2008). So far, the X-ray tomography is a well known technique and is extensively used in several earth science disciplines. As computed tomography allows quantification of the scanned material in all 3 spatial dimensions, the metric and biometric analyses represent the main field of application for X-ray methodology.

The description of fossil forms and the quantification of some morphologic relevant parameter are the keys to investigate fossils for taxonomic purposes, and consequently for paleoenvironmental analyses and for biostratigraphic purposes. Measuring morphologic parameters of shells, bones or tests requires often the destruction of part of the body, or oriented cuts through the test. Since the prices for X-ray computed tomography working stations have became available for academia, the use of such technique is spreading in many geological and paleontological research institution.

MATERIAL AND METHODS

In this study, we used high resolution x-ray tomography to run some measurements on well preserved tests of fossil foraminifers, in particular we have investigated two specimens of a new rotaliid. With dedicated 3D graphic working station at the department of Palaeontology in the University of Vienna, all chambers of the foraminifer have been segmented, rendered and on the extracted three dimensional objects, the reported parameters have been measured.

A new species has been detected and studied by means of x-ray tomography. The specimens have been collected from the type locality of the Porto Badisco Calcarenites, which is the Porto Badisco cove, 8 km south of Otranto, in the Salento Peninsula. PARENTE (1994) defined the stratigraphy of the Upper Cretaceous to Oligocene deposits of Salento Peninsula (Southern Apulia), and assigned the Porto Badisco Calcarenites Formation to the late Chattian (Late Oligocene) according to the fossil content.

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RESULTS

The new species has been preliminarily named *Risananeiza* sp. as it possesses all morphological features of the relative forms of the genus *Risananeiza* (Boukhary et alii, 2008). Detailed biometry on the type material, and the complete description of the new species, are under review by the Bollettino della Societá Paleontologica Italiana.

Since the dataset obtained by x-ray scanning is digital, it can be uploaded and shared with the scientific community so that the 3D model of the holotype can be seen and studied by everyone (Fig.1). Complete stacks of the holotype sliced on the equatorial (Fig.2) and on the axial planes (not given here), most important for taxonomic purposes, are also reported.

REFERENCES


Fig. 2 – Complete stacks of the possible holotype of *Risananeiza* sp. (scanned with microCT) sliced on the equatorial planes.