COMBINING HIGH RESOLUTION COMPUTED TOMOGRAPHY AND SCANNING ELECTRON MICROSCOPY TO ASSESS BIOCONSTRUCTION AND BIOEROSION PROCESSES IN BIOGENIC REEFS

Eva TURICCHIA[1,5], Massimo PONTI[1,5], Matteo BETTUZZI[2,6], Maria Pia MORIGI[2,6], Rosa BRANCACCIO[2,6], Annalisa FALACE[3,5], Sara KALEB[3,5], Fabio RINDI[4,5] and Marco ABBIATI[1,5,7]

[1]Dipartimento di Scienze Biologiche, Geologiche e Ambientali (BiGeA), University of Bologna, Via S. Alberto 163, 48123 Ravenna, Italy
[2]Dipartimento di Fisica e Astronomia (DiFA), University of Bologna, Viale Berti Pichat 6/2, 40127, Bologna, Italy
[3]Dipartimento di Scienze della Vita (DSV), University of Trieste, Via Giorgieri 10, 34127 Trieste, Italy
[4]Dipartimento di Scienze della Vita e dell'Ambiente (DiSVA), Polytechnic University of Marche, Via Brecce Bianche – Monte Dago, 60131 Ancona, Italy.
[5]Consorzio Nazionale Interuniversitario per le Scienze del Mare (CoNISMa), Piazzale Flaminio 9, 00196 Roma, Italy
[6]National Institute of Nuclear Physics – Section of Bologna (INFN), Viale Berti Pichat 6/2, 40127, Bologna, Italy
[7]Istituto di Scienze Marine (ISMAR), Consiglio Nazionale delle Ricerche, Bologna, Italy

e-mail: eva.turicchia2@unibo.it

Presentation type: ORAL

Bioconstruction and bioerosion are key processes in mesophotic temperate reefs, and act at different spatial and temporal scales. The study of the microscale processes, driving the dynamic balance leading to the formation of coralligenous banks, requires sophisticated investigation techniques. The scanning electron microscopy (SEM) coupled with molecular tools, are essential for the identification of the building species and of their growth patterns. These approaches are particularly effective for the coralline algae, which are among major reefs builders. SEM can be used to study morpho-anatomical features and bio-mineralisation patterns in coralline algae. Investigation on bioerosion species and processes requires the analysis of the shape of holes and cavities hidden inside the substrates, and the signs left by organisms, often vanished after their death. SEM may reveal occurrence of microborers in algal tissues (i.e., cyanobacteria and endolithic chlorophytes). High resolution Computed Tomography (CT), offers new opportunities to visualise the internal and external morphology of the bioconstructions. This technology is widely used in medical, archaeological, geological and industrial applications. CT combines the use of X-rays and computerised analysis of the images allowing the generation of 3D volume reconstruction of the object. This imaging technique allows investigating the inner structure of biogenic substrates at a very fine scale, without destroying the sample. CT has been used to analyse short and long-term (i.e., 3 and 14 years) bioconstruction and bioerosion processes occurring in travertine tiles deployed on different typologies of mesophotic biogenic reefs in the northern Adriatic Sea. Builders were mainly represented by coralline algae, bivalves and polychaetes, while the most important borers were sponges and bivalves. Boring species leave recognisable traces inside the substrates allowing measuring the eroded volume and estimating the net balance between construction and destruction. Understanding of these processes is a major step towards the conservation of biogenic habitats in the Mediterranean Sea.