Coastal and Marine geomorphological and environmental study of St. George bay, Western Naxos, Greece

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In order to study the geomorphological and environmental characteristics of St. George bay, western Naxos, Greece (Fig. 1), a series of 14 beachrock samples were collected and examined. Two transections of the bay, based on field measurements, were designed, in order to provide a deeper understanding of the beachrock development setting. Detailed recording of the beachrocks was accomplished through scuba diving, using a sonar device, measuring tapes, GPS device and Dive Computer.

Special attention was given to the cement, as to extract information about the conditions of formation of the beachrocks. Thin sections from the beachrock samples were studied through petrographic microscope in order to investigate their basic characteristics and to obtain information about their basic petrographic and mineral composition. Scanning Electron Microscopy (SEM) alongside with Energy Dispersive Spetrometry (EDS) were used for elemental analysis of the beachrock samples and their cement and Raman spectroscopy was used for identification of the cement crystal structure. For better interpretation of the results, the suggested tool, by Mauz *et al.* (2015), for reconstructing relative sea level in the far-field was used.

In order to estimate the ecological status of the bay, a study of the macroalgae of the area was also accomplished. Macroalgae sampling of two different methods was conducted, destructive (conventional samples) and non-destructive (photographic samples). 57 conventional samples were collected throughout the beachrock reef. These samples were prepared into herbariums and were identified in the best taxonomic level possible using stereoscope and microscope. Photographic samples were taken from the southwestern and northeastern part of St. George bay, from different types of bedrock (beachrocks, granodiorite, aeolianite) for comparison reasons. The percentages of different types of surface coverage (algal, sediment coverage) were counted for each sample, using the program Adobe Photoshop CS6. Finally, a statistical analysis of the data from the photographic samples was conducted, using the program PRIMER 5, in order to have a better evaluation of the algae data. The depth and coordinates of each conventional and photographic sample were recorded.

The results regarding the beach rock samples indicate that their formation took place under meteoric and marine vadose zone conditions. Certain results indicate that the development of the beachrocks took place during a sea level rise. Finally, macroalgae statistical analyses indicated that there are no significant differences between beachrocks and other rocks as substrates and the overall ecological status of St. George bay can be characterized as good, according to the Ecological Evaluation Index (EEI, Orfanidis *et al.,* 2003).

Figure 1 Geographical setting of study area: (A) Naxos island, (B) St. George bay (Google Earth images).

References

Mauz, B., Vacchi, M., Green, A., Hoffmann, G., & Cooper, A., 2015. Beachrock: a tool for reconstructing relative sea level in the far-field. Marine Geology, 362, 1-16.

Orfanidis, S., Panayotidis, P., Stamatis, N., 2003. An insight to the ecological evaluation index (EEI). Ecological Indicators, 3(1), 27–33.