

COVERAGE AND DIVERSITY OF SESSILE BENTHOS IN A SEMI-SUBMERGED MARINE CAVE (AEGEAN SEA): DOES POSITION MATTER?

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INTRODUCTION

Various morphological types of marine caves have been identified across the Mediterranean rocky coasts. Morphological complexity inside caves creates abiotic gradients which are reflected in the spatial heterogeneity of sessile benthos. To date, distinct patterns of biotic zonation have been described in different cave types of the northwestern and central Mediterranean basin. Relevant studies mainly investigate differentiation across the longitudinal cave axis, in relation to the distance from the entrance. As part of a broader recent attempt to study cave biotic zonation in the Aegean ecoregion, we investigated the spatial variability of sessile benthos in a tunnel-shaped semi-submerged cave of the northern Aegean Sea.

METHODS

The studied cave is located on Agios Efstratios Island which is part of the Greek Natura network (GR4110002 Site of Community Importance). A non-destructive photographic method and advanced image processing software (photoQuad) was used for the study of benthic communities. A total of 63 photoquadrats (25 x 25 cm) were photographed at 3 different positions (3 quadrats on each vertical wall, left and right, and 3 on the floor) in seven distinct cave sectors (Fig. 1). Additional qualitative samples were taken to confirm identifications of sponges observed in the analyzed photoquadrats.

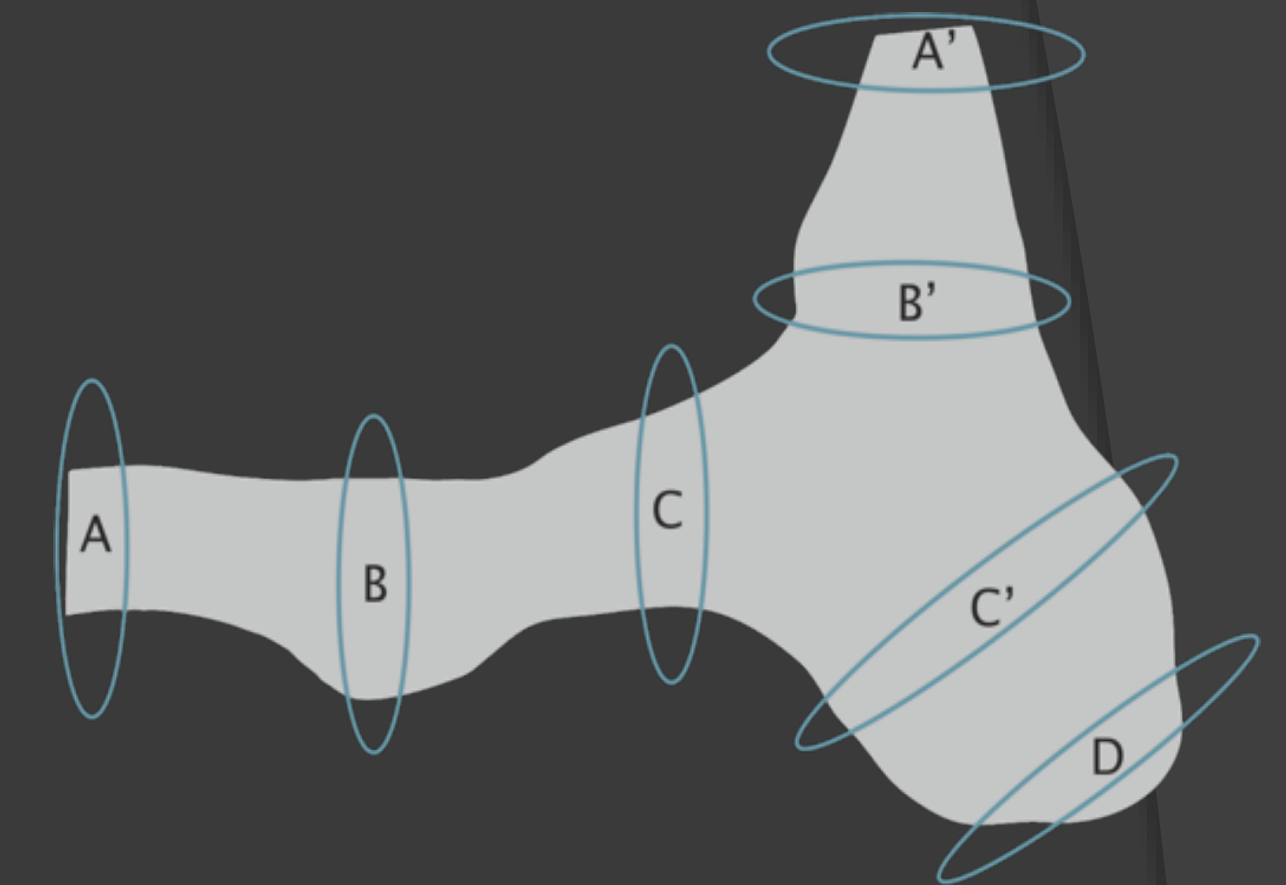
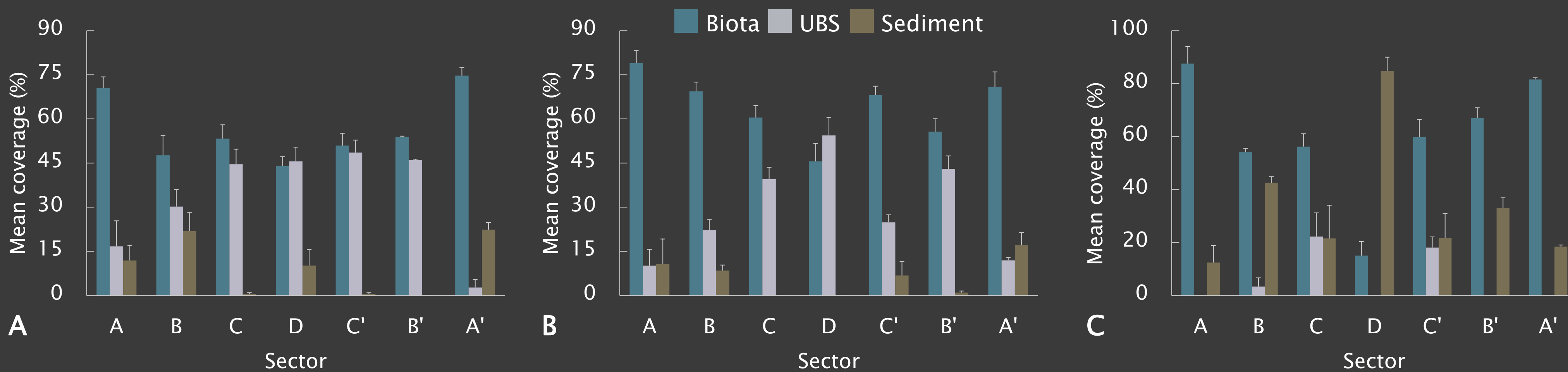


Fig 1. Plan view of the studied cave depicting the sampling sectors.

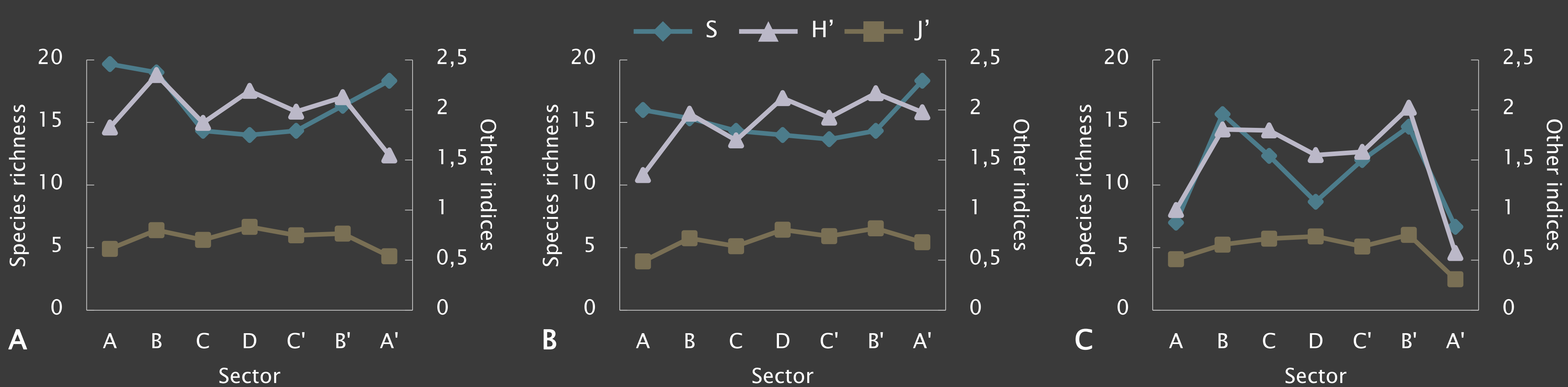
RESULTS

Image analysis revealed the presence of 47 taxa, 26 of which were classified in the phylum Porifera, 10 were macroalgae (mainly Rhodophyta), 5 Anthozoa, 3 Bryozoa, 1 Foraminifera, 1 Polychaeta, and 1 Tunicata. Different patterns were observed between the walls and the floor with regard to the biotic coverage and diversity indices.



There was a decline in the mean biotic coverage from the entrances to the inner part of the cave (Fig 2). The floor exhibited strong sedimentation and was therefore differentiated from the walls.

Fig 2. Mean percent coverage of the left wall (A), right wall (B), and floor (C) with biota, unidentified biogenic substrate (UBS), and sediment in each sector of the cave.



Species richness, Shannon-Wiener diversity and evenness showed similar fluctuation patterns on the opposite walls, but were differentiated on the floor, where lower values of the aforementioned indices were recorded (Fig. 3).

Fig 3. Diversity indices for the left wall (A), right wall (B), and floor (C) in each sector of the cave.

Similarity analysis separated the luminous entrance floors from the rest of the photoquadrats revealing groups that roughly corresponded to the sciaphilic algal-dominated entrance zone and the intermediate semidark cave sectors, where sessile invertebrates dominated (Fig. 4); in the latter zone, local variations were observed due to the development of different invertebrate facies (e.g. sponges, scleractinians and encrusting bryozoans).

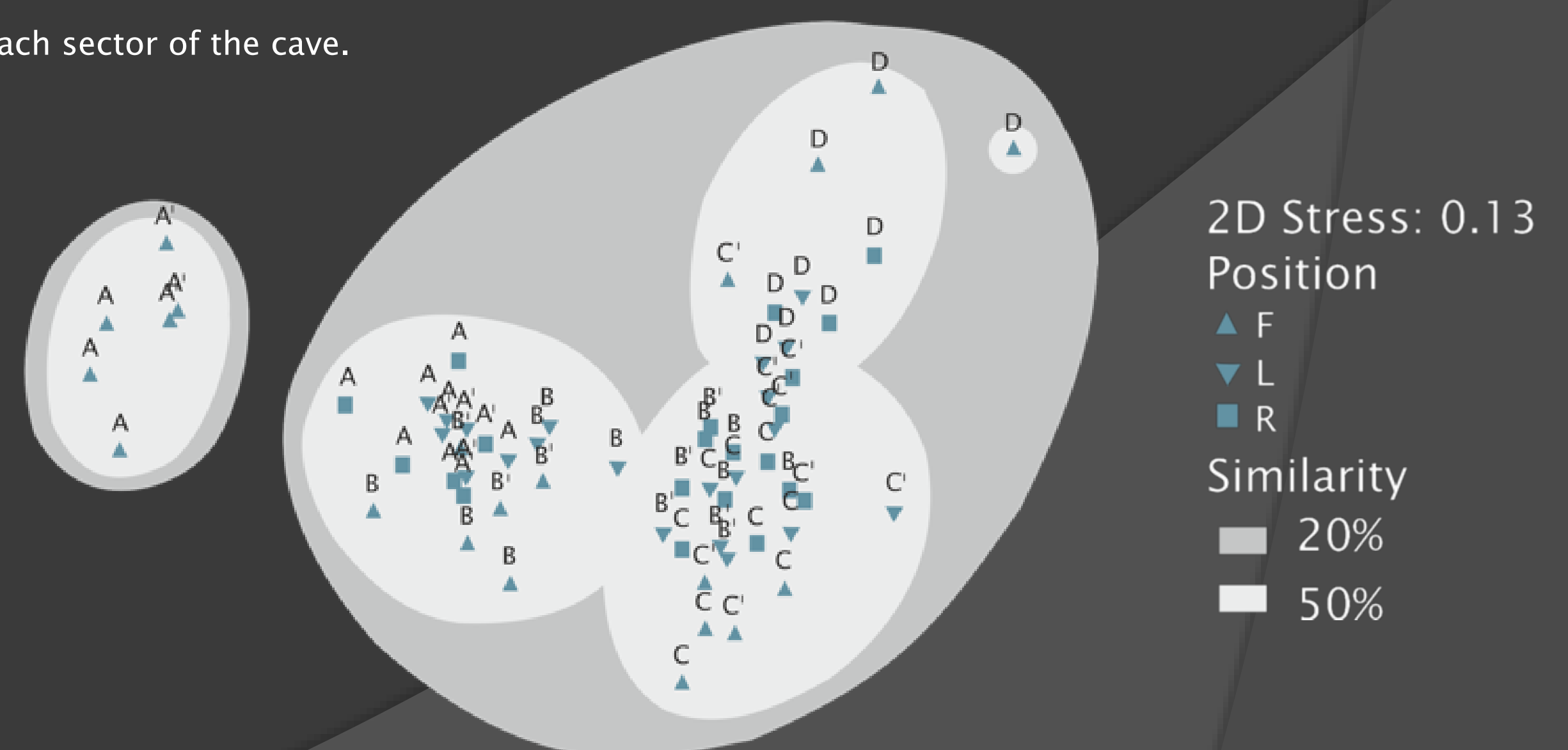


Fig 4. MDS plot demonstrating photoquadrat resemblance based on mean percent coverage in the different positions of each sector of the cave.

CONCLUSION

In conclusion, both the distance from the entrance and the position inside the cave had an impact on the spatial biodiversity patterns. It would be interesting to investigate patterns of spatial variability in caves of different types and in different areas of the Aegean ecoregion, which, despite its biogeographical interest, has been poorly investigated for its marine cave biodiversity.