Rolling around rocky shelfs: formation and fate of rhodoliths on north Atlantic islands

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Rhodoliths can be regarded as the response of coralline red algae to a lack of hard substratum. They form unattached nodular aggregates that are mainly composed of coralline algae. Since they are not attached to any substratum, their composition, growth from and size are controlled by the physical conditions of the depositional/living environment. These control composition, growth form and size of the heavily calcified nodules. As a consequence, deep-water rhodoliths usually show a different taxonomic composition then shallow-water equivalents, and high-energetic nodules have other growth forms than low-energetic ones. Therefore, rhodoliths are valuable proxies for the analysis of fossil environments.

The analysis of rhodoliths for the reconstruction of fossil environments requires, however, a profound knowledge of their extant equivalents. In this discipline, the actuopaleontology, W.E. Piller stands for a long but modern tradition of calcareous algae researchers and marine geologists. With his actuopaleontological research in the Northern Bay of Safaga, Egypt, he has inspired a number of (at that time) young researchers.

This presentation shows three examples for such an approach, dealing with the Macaronesian islands in the Northern Atlantic, which include the Azores in the north, and the Cape Verde islands in the tropical belt in the south. They are comparably young volcanic islands and reveal Late Pliocene to Recent rhodoliths. The topographic changes of the islands over time are well-known and have been studied in detail, including the relative sea-level changes. This makes them a perfect natural laboratory for the study of extant rhodoliths and their implications for the fossil record. We are currently studying them in cooperation with biologists, paleontologists, and volcanologists from the Universities of the Azores and Lisbon.

The Azores archipelago in the North of the study area reveals the lowest abundance of Recent rhodoliths. This is due to the young age of the islands, and Atlantic storms that transport rhodoliths permanently down a very steep slope. Fossil rhodoliths are mainly known as storm deposits trapped between pillow lava. They were studied by A.C. Rebelo during heir doctoral thesis. The Canary Islands further to the south comprise partially huge numbers of rhodoliths. They form beach berms and often cover complete beaches (Fig. 1).

Fig. 1: The so-called popcorn beach in the North of Fuerteventura with rhodoliths ('popcorn') covering the beach.

Of particular interest are the Cape Verde islands. They show a wide range of shallow shelf areas and bays, in which rhodoliths can accumulate with numerous growth forms and types. They are currently studied in a PostDoc project by A.C. Rebelo. Fossil rhodoliths are often part of tsunami deposits, which are currently studied by a working group from Lisbon. They allow to reconstruct the effect of tsunamis onto shelf areas and may also allow predictions for future events. For this question, a project proposal is going to be submitted, since the Cape Verdes provide one special feature: The climate has not changed during the last ca. 700.000 years, which makes the Recent rhodoliths directly comparable to their fossil counterparts. This is the perfect starting point for actuopaleontological studies.