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# Coastal rock pools development in a carbonate sandstone: analysis of growing processes related to coastal zonation in a Mediterranean site (SE Sicily, Italy)

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Rock pools are common features in carbonatic coastal environments, both on limestones and on carbonatic sandstones. Many processes are invoked by several authors to explain the development of these features.

The aim of this work is to study the processes involved in rock pools growth in a carbonate sandstone coast in a Mediterranean site. The studied area is localized at Torre Vendicari, SE Sicily, Italy. In this site many rock pools are present from the coastal line to some tens of meters inland.

A coastal zonation has been carried out on the basis of different colours and of minor cavities shape, dimensions and distribution.

Two transects 26 and 18 m long have been chosen perpendicular to coastal line. Here morphometrical analyses have been carried out, considering maximum and minimum diameter of rock pools and their depth, colour, shape, distance and altitude from biological sea level. More, organisms and salt occurrence and distribution have been considered.

The chemical parameters measured *in situ* on rock pools water are pH, dissolved carbonates, dissolved $O_2$, conductivity and temperature. These analyses have been carried out in different seasons at different timing. In some rock pools pH and temperature analyses have been carried out in different weather conditions, in order to verify the influence of rainfalls on these parameters.

Thin sections and SEM analyses have been carried out to study weathering features at the micro-scale.

The first result is the discrimination of five zones that are identified by numbers and reflect the distance and the altitude from the biological sea level, the zone 0 being below the biological sea level and the zone 4 being the most inland one.

The rock pools characteristics change in the different zones. In zone 4 rock pools are generally smaller than in the other zones and have an irregular bottom. In zone 3 walls are clearly overhanging and bottoms are generally flat and smooth. In zone 2 rock pools are wider than in other zones and coalescent features are common; overhanging walls are less diffuse and bottoms have more irregularities than in zone 3. In zone 1 destroyed rock pools are very abundant and small cavities frequently occur on the bottoms and on the walls.

Gastropoda *Littorina spp* are more abundant in zones 2 and 3 and their distribution changes from winter to summer. Chitons, limpets and barnacles are common in the zone 1.

At the microscale, the occurrence of weathering features like tunnels and borings due to cianoficeaee are more evident inside rock pools than outside; weathering features like V-in-V etching are mainly recognizable inside tunnels.

Dissolved carbonate and pH values do not justify the occurrence of dissolution at the present time.

All these data suggest that different processes are present in different zones.

In the most inland zone (4), the pre-existing depressions on the rock are reworked only by a poor action of scarce cyanoficeae and by the mixing water (sea and rainfall) during the winter. In zone 3 the main process is bio-erosion, due to mechanical action of gastropoda like *Littorina spp* and cyanoficeae, and by chemical dissolution induced by cyanoficeae. In zone 2 the processes are the same of those verified in zone 3, but they are more intense due to the proximity to the sea. Moreover a low mechanical action of the waves has effect. In zone 1, the dominant process is the demolition of the rock pools due to the action of waves and to bio-erosion induced by chitons and by other gastropods.