

Habitat characteristics influence macrofaunal communities in coralline turf more than mesoscale coastal upwelling on the coast of Northern Chile

Brendan P. Kelaher, Juan Carlos Castilla

Abstract

Rocky shore communities are often influenced by near-shore coastal upwelling. For macrofauna in algal turf, these effects may be caused directly by well-studied bottom-up mechanisms or indirectly via changes in habitat structure provided by algal turf associated high nutrient loads. Here, we investigated possible interactions between upwelling and habitat structure by sampling diverse faunal assemblages in coralline algal turf on seven rocky intertidal shores in northern Chile, ranging from El Cobre [23°17'1"S, 70°31'40"W] to La Lobería [23°03'40"S, 70°33'14"W]. Some of these shores were located adjacent to strong upwelling centers, while others were in areas rarely affected. On each shore, we sampled four (2 × 2 m) sites separated by 15–50 m. In each site, we collected three replicate cores (80 mm in diameter) from which we measured macrofauna greater than 850 µm, biomass of sediment and epiphytes, frond density and average frond length. We used mean water temperature and its variation at 1–1.5 m water depth (below Extreme Low Water Spring, ELWS) to represent local upwelling intensity because long-term data have shown that these variables make excellent indicators for this region. In total, we found 94 macrofaunal taxa in coralline turf, which is almost three times higher than has previously been reported in Chile. Although macrofaunal assemblages varied significantly among shores, there were no patterns to suggest mesoscale variation in upwelling intensity affected either faunal assemblages or local habitat characteristics. In contrast, multivariate and univariate correlations highlighted sediment and frond density as strong determinants of community structure. We therefore conclude that traditionally studied habitat characteristics, such as structural complexity and habitat heterogeneity, have greater influence on faunal assemblages in mat-like habitats on rocky shores than environmental variables associated with mesoscale coastal upwelling.

Keywords

Macrofauna; coralline turf; upwelling; habitat characteristics; sediment; structural complexity and rocky shore