

Interhemispheric consistency of scale-dependent spatial variation in the structure of intertidal rocky-shore communities

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In rocky intertidal environments, the vertical gradient of abiotic stress generates, directly or indirectly, significant spatial variation in community structure. Along shorelines within biogeographic regions, abiotic changes also generate horizontal biological variation, which when measured at large sampling intervals may surpass vertical biological variation. Little is known, however, on how vertical variation compares with horizontal variation measured at multiple spatial scales in habitats with similar environmental conditions. Here, we compare spatial variability in rocky-intertidal communities between vertical stress gradients and three horizontal spatial scales (sampling interval) across habitats experiencing the same wave exposure on the Northwest Atlantic (NWA) and Southeast Pacific (SEP) coasts. For both regions, the vertical variation in species richness and composition (Raup-Crick and Bray-Curtis indices) was higher than the variation measured at all horizontal scales, from a few cm to hundreds of km. The patterns of

variation in community structure matched those of abundance for the dominant sessile organisms, the foundation species *Ascophyllum nodosum* (seaweed) in NWA and *Perumytilus purpuratus* (mussel) in SEP. This interhemispheric comparison reveals the tight link between environmental and biological variation, indicating that studies comparing spatial scales of biological variation must consider the underlying environmental variation in addition to simply scale alone.

Key words: community structure, intertidal, spatial scale, spatial variability