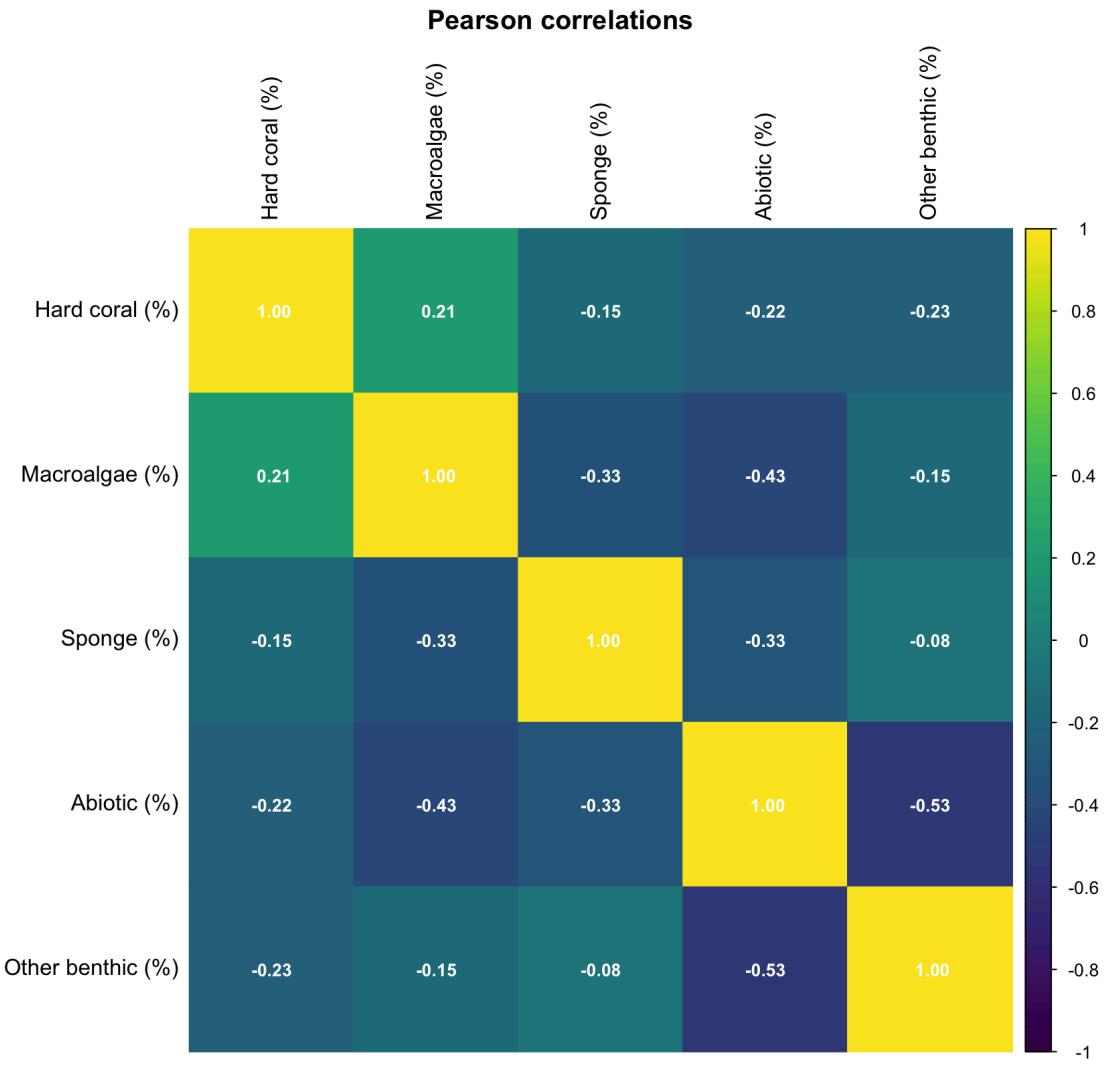

Figure | Heatmap of Pearson correlation coefficients among percent cover of major benthic substrate categories (coral, algae, sponge, abiotic, and other) across all transects. Blue colours denote positive correlations, red indicate negative correlations, and colour intensity reflects the strength of association. Abiotic cover showed strong negative correlations with both algae and coral cover, while other relationships were generally weak to moderate.

Relationships Among Substrate Types

Pairwise Pearson correlation analyses were used to examine relationships among major benthic categories: coral, algae, sponge, abiotic substrate, and other benthic biota. The results are summarized in a correlation heatmap (Figure). The strongest negative correlation was between abiotic cover and algal cover (r = –0.605),

suggesting that transects with high abiotic cover tended to have lower algal cover. Negative associations were also observed between abiotic cover and coral ($r = –0.450$) and sponge ($r = –0.445$). Algal and sponge cover were negatively associated ($r = –0.335$), suggesting that the presence of one may limit the other or reflect different site-level benthic conditions. In contrast, coral and algal cover displayed a weak positive correlation ($r = 0.209$). Most other pairwise associations were weak or near zero, indicating limited direct relationships among the remaining broad substrate categories. Collectively, these correlations suggest that increases in abiotic substrate were generally associated with reduced living cover, while some living components, such as coral and algae, may co-occur under certain site conditions.