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TITLE: The influence of atmospheric cold fronts on larval supply and settlement of intertidal invertebrates: Case studies in the Cabo Frio coastal upwelling system (SE Brazil)

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ABSTRACT:

Atmospheric fronts such as cold fronts are dynamic mesoscale systems with potential effects on the ecology of marine communities. In this study, larval dynamics in subtropical rocky shore communities were evaluated under the influence of atmospheric frontal systems. The hypothesis is that these systems may promote favorable conditions for larval supply and settlement regardless of taxa or site, and that supply and settlement vary in association with fluctuations of meteorological and oceanographic conditions driven by the fronts. This study was carried out in the Southeastern Brazil littoral region under the influence of coastal upwelling events (Cabo Frio) and subject to weekly atmospheric frontal systems, cold polar fronts. The spatial and temporal variability of larvae and settlers of barnacles and mussels were assessed by collecting daily samples at three sites before, during and after atmospheric cold fronts, and the atmospheric and pelagic conditions were monitored. Contrasts among rates, events and sites were tested using discriminant function analysis, analyses of variance and correlation analysis. Atmospheric frontal systems were considered to influence the sites when wind direction changed to SW-S-SE and persisted for at least a day, and waves from SW-SW-SE increased in height. The results corroborate the hypothesis that cold fronts are important regulators of larval dynamics and intertidal communities on rocky shores of the studied area. Both larval supply and settlement were highly correlated with fluctuations in wind speed and direction. Higher settlement rates of barnacles occurred one-day prior, or on the onset of cold fronts. Mussels species tended to settle during all conditions, but on average, settlement rates were higher during the cold fronts. Some temporal trends were site specific and variability was detected among taxa and larval stages. Our findings suggest that mesoscale oceanographic/atmospheric systems are particularly relevant on the regulation and potentially forecasting of rocky shore invertebrates' ecology.

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