How does the timing of the tide influence thermal stresses experienced by the blue mussel Mytilus edulis?

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Rising air and water temperatures are expected to increase the thermal stresses which intertidal organisms experience. Intertidal organisms living close to their thermal tolerances are exposed to thermal extremes that can affect their health, growth, development and survival – ultimately influencing the functioning and structure of ecological communities, resulting in species loss and devastating the shellfish industry. The large tidal range of the eastern Irish Sea has extensive intertidal zones that are exposed at varying times of the day over the springs-neaps cycle. Large differences in tidal phasing occur across small geographic distances: Along the coast of South Wales spring low tides occur in the middle of the day, whereas in North Wales (< 160 km distance) spring low tides occur in the morning and the evening. To determine how these tidal patterns influence the thermal stresses experienced by intertidal organisms, the blue mussel, Mytilus edulis was used as a representative species. Biomimetic loggers (robomussels) which estimate mussel body temperatures were deployed across the intertidal zone at a site in North Wales and South Wales, respectively. For both sites, the warmest robomussel temperatures were recorded during lunchtime exposures with lunchtime spring lows generally resulting in greater heat stresses. This suggests that heat stresses for intertidal organisms may be more severe in intertidal zones which have frequent or long duration aerial exposures, particularly during the middle of the day. These conclusions may be used to identify shellfish cultures at greater risk of mortalities from heat exposure on a greater geographic range.