



Climate Change Effects on Intertidal Populations

Issue:

Species living in the intertidal zone, between the high and low tide marks on the shores of the world's oceans, can be especially sensitive to climate variability. Animals and plants that live in this habitat are covered with seawater at high tide, and exposed to the air at low tide. As a result, their body temperatures fluctuate greatly over the course of a single day. Understanding the influence of long-term temperature changes on these species will allow us to predict changes in their distributions, and provide information for the management of coastal environments.

This project uses models and observations of air and ocean temperatures to forecast the body temperatures of intertidal species at low tide, when they are most vulnerable. These projected body temperatures are compared to experimentally-derived tolerances of the species, and geographic "hot spots" are identified where climate change could have important effects on intertidal ecosystems.



How susceptible are intertidal ecosystems to temperature changes?

- Are changes in species distributions or mass die-offs part of natural cycles, or are they caused by climate change, pollution or other stressors?
- Are preserves and management areas located in areas vulnerable to increased temperatures, or could they be resistant to such changes?

Approach:

A team of researchers at the University of South Carolina is developing mechanistic links between climate, geography, and population biology of the dominant intertidal species. The target organisms are considered ecosystem "foundation species", meaning that they have large physical impacts on their surrounding ecosystems. For sedimentary shores, the target organisms are animals that can either disrupt sediments (e.g., shrimp and worms) or build tubes and reefs (e.g., worms, oysters). For rocky shores, the targeted organisms are those that occupy and create hard surfaces, such as barnacles and mussels.

The geographic range of the project is from Alaska to Mexico on the Pacific Coast and Maine to South Carolina on the Atlantic Coast, spanning the geographic limits of these ecosystem

