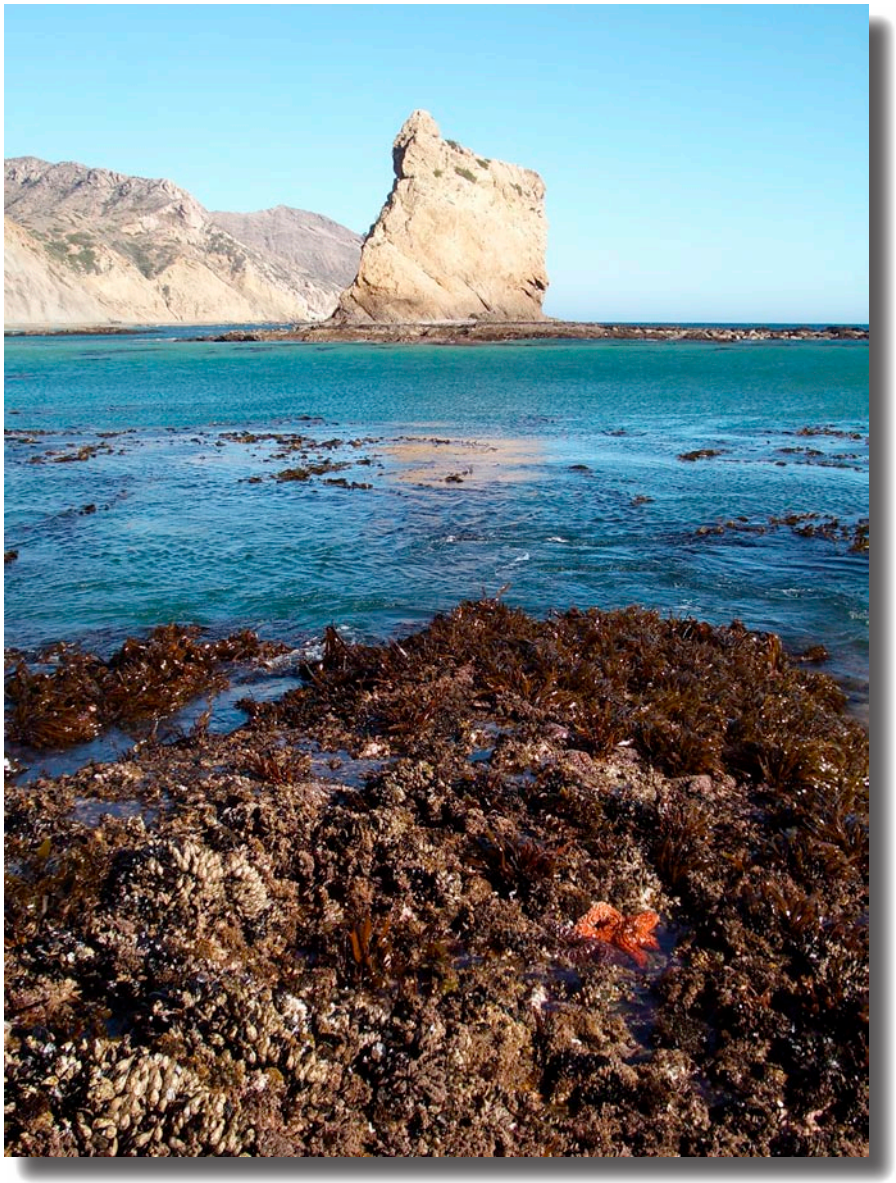
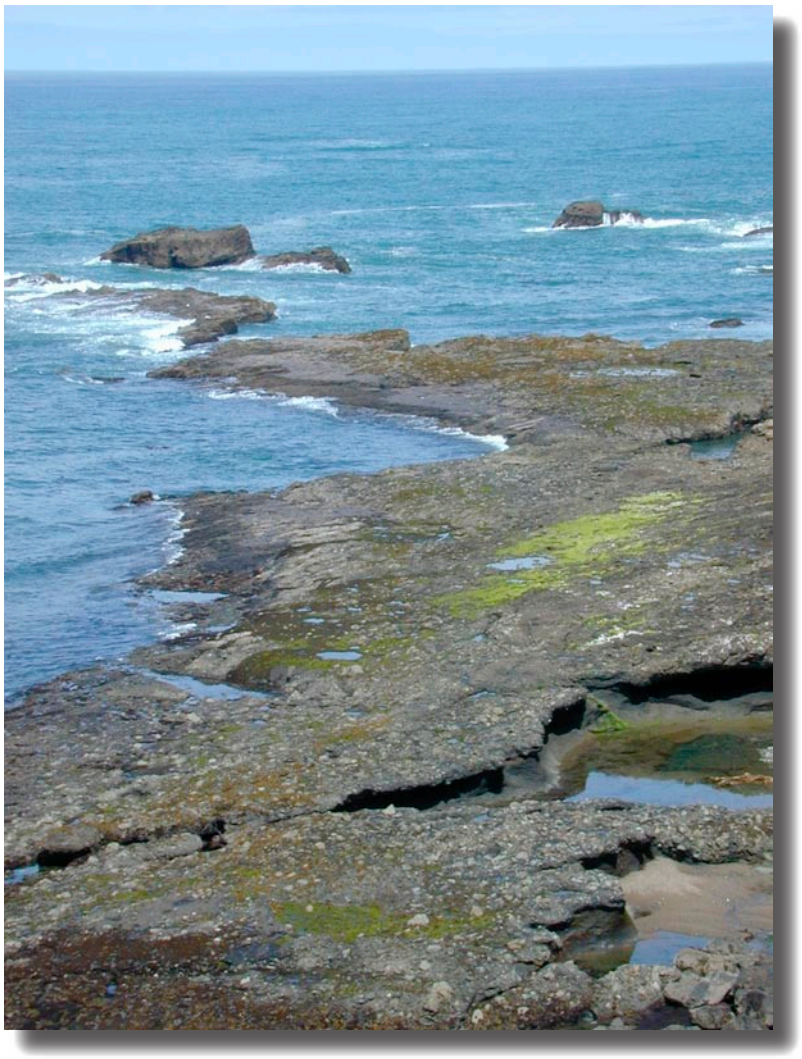
MOSAIC PATTERNS OF THERMAL STRESS IN THE ROCKY INTERTIDAL ZONE

Rocky intertidal mussels experience rapid fluctuations in aerial body temperature during low tide. Because of variability in tidal regimes and climatic regimes, geographic gradients in body temperature along the west coast of the United States may be much more complex than previous assumed. As a result, climate change may not lead to poleward range shifts, but instead may cause damage at a series of "hot spots." All photos by Brian Helmuth, unless noted otherwise.



Rocky intertidal zone at Santa Cruz Island, California. Photo credit: C. Blanchette



Rocky intertidal zone at Boiler Bay, Oregon. The intertidal zone represents the interface between the terrestrial and marine environments. Thus animals and algae in these environments may be among the first ecosystems to exhibit responses to global climate change.

Strawberry Draw, Tatoosh Island, Washington State. The rocky intertidal zone has long served as an experimental laboratory for investigating the influence of climate on small-scale distribution patterns of organisms.

Mytilus. Results suggest that patterns of aerial body temperature (and in particular maximum temperature) may be complex, and thus patterns of mortality (expired mussel shown here from Bodega Bay, California) may occur in unexpected locations. Photo credit: C. Harley

Intertidal zone at Tatoosh Island, Washington.

Sensors were deployed at midtidal heights at a series of sites in mussel beds in order to measure geographic patterns in aerial and aquatic body temperatures (Tatoosh Island, Washington).

In their article, Helmuth et al. describe how latitudinal patterns of intertidal thermal stress may be more complex than anticipated. Using a series of biomimetic temperature loggers designed to mimic the thermal characteristics of mussels (*Mytilus californianus*), shown here, they measured temperature patterns at sites ranging from northern Washington to southern California.

Intertidal zone at Tatoosh Island, Washington.

These photographs illustrate the article, "Mosaic patterns of thermal stress in the rocky intertidal zone: implications for climate change," by Brian Helmuth, Bernardo R. Broitman, Carol A. Blanchette, Sarah Gilman, Patricia Halpin, Christopher D. G. Harley, Michael J. O'Donnell, Gretchen E. Hofmann, Bruce Menge, and Denise Strickland, which appeared in *Ecological Monographs* 76:461–479, November 2006.