

Effects of ocean acidification and temperature on invertebrate activity, behaviour and function



Jasmin Godbold and Martin Solan



Oceanlab, University of Aberdeen, Main Street, Newburgh, Aberdeenshire. AB41 6AA.
j.a.godbold@abdn.ac.uk ; m.solan@abdn.ac.uk

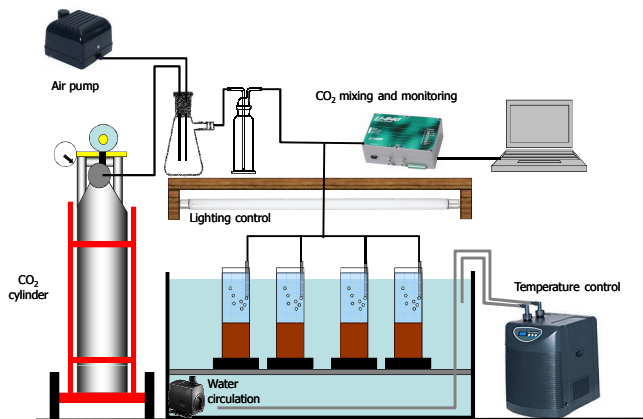
The biological effects of ocean acidification have been shown to be strong and largely negative across a wide range of species, but the implications of physiological change on organism activity, behaviour and/or ecosystem functioning has received little attention. Here we present the experimental design and some initial findings of an ongoing series of experiments designed to assess the impact of short, medium and long-term exposure to elevated CO₂ and temperature, and their interactions, on the rate and efficiency of biologically mediated ecosystem processes (bioturbation, bioirrigation) for three key benthic invertebrates.

Experimental design

We are examining the impact of elevated CO₂ and temperature in a 2-way crossed design. The impact of **CO₂ (380, 750 and 1000 ppm)** and **temperature (10°C constant, ambient and ambient + 4°C on a seasonal cycle)** on invertebrate **bioturbation and bioirrigation** is being assessed **after 0, 3, 6, 12 and 18 months** of exposure.

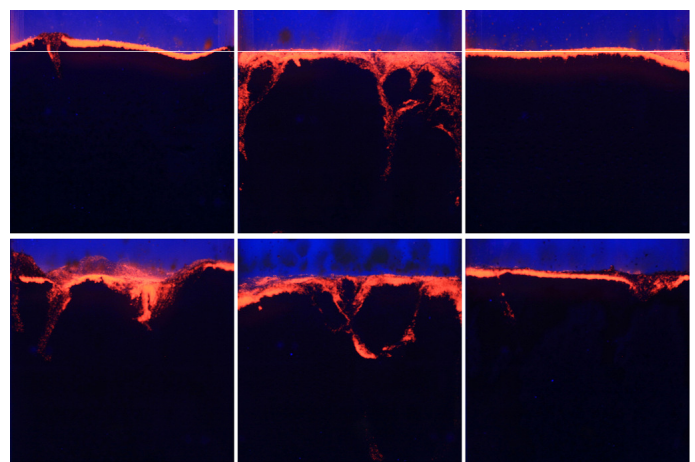


Amphiuira filiformis *Cerastoderma edule* *Nereis virens*

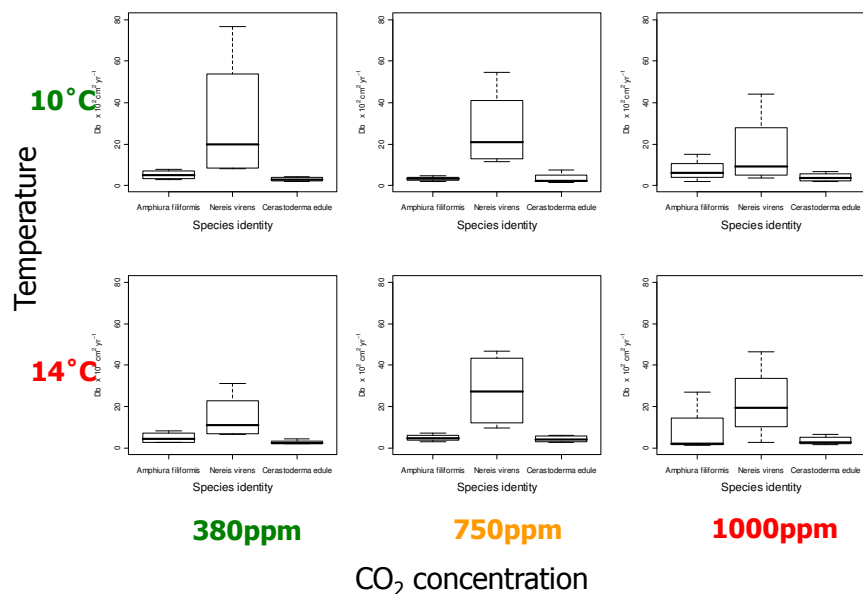


Mesocosm facilities at Oceanlab, University of Aberdeen.

Examples from short term exposures



Representative fluorescent sediment profile images for *A. filiformis* (left column), *N. virens* (central column) and *C. edule* (right column) following short term exposure to 10° C and 380 ppm CO₂ [= ambient] (top row) or 14° C and 1000 ppm CO₂ [= future] (bottom row).



Preliminary results showing the effects of temperature, CO₂ concentration and species identity on bioturbation intensity (Db, cm² yr⁻¹) after a short term exposure. Statistical analyses and full examination of these data are ongoing. Bioirrigation data was not available at the time of printing.