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Ocean acidification effects on growth and calcification of Lithophyllum incrustans Philippi (Corallinaceae, Rhodophyta): first result.

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The atmospheric pCO2 rising and ocean acidification originating from human activities induce changes in seawater chemistry. This change in seawater chemistry could affect different groups of marine organisms in different ways. Particularly vulnerable are those organisms which rely on the production of calcified tests or shells for survival. Corallinaceae deposit high-magnesium calcite into their cell walls, a more soluble form of carbonate than either calcite or aragonite, which make these species particularly sensitive to decreasing carbonate saturation state.
For these reasons a study on the effect of ocean acidification on the growth and calcification of Lithophyllum incrustans Philippi (crustose coralline algae, CCA) was realized in microcosm.
L. incrustans was sampled in the gulf of Trieste (north Adriatic, Mediterranean Sea) to a depth of 3-4 m. This species of CCA was submitted (aeration with air CO2 enriched) to different pH in three different tanks (15 lt each) – control tank pH = 8.2; intermediate tank pH = 8.0; acidic tank pH = 7.8. We carried out three "mono-phase cultures" (June, September and December 2010 – 2 months) during which the values of pCO2 and of pH were maintained constant in each tank during the entire period of insemination; we made a “tri-phase culture” (December 2009 – 6 months) during which the pH was progressively fitted step by step in three phases. The growth of L. incrustans was studied with alizarin stain (0.25 mg/l); the calcification was studied with alkalinity anomaly method and electron scanning microscope (SEM). The values of pH, salinity, temperature and Total Alkalinity of the seawater were randomly recorded several times a day for all the duration of the culture.
The rate of calcification and the growth of L. incrustans appeared to be negatively affected by the rising acidity of seawater. The difference of CCA growth was statistically significant (R software, ANOVA test, Tukey’s post-hoc test). The epithallus of L. incrustans – SEM observation – shows a gradual degradation with decreasing pH.
This first result seems therefore to underline that the increasing of seawater acidity in microcosm determines an inhibition of the growth and calcification of L. incrustans; also this species seems therefore affected by the decrease of pH seawater as described in other CCA species, for example, by Hall-Spencer et al. (2008) and Jokiel et al. (2008).