ECOPHYSIOLOGICAL CHANGES OF HERMATYPIC SCLERACTINIANS IN HIGH pCO_2 CHEMOSTAT

Julien Leblud[1]*, Antoine Batigny[1] Laure Moulin [2,1] & Philippe Grosjean[1]

Understanding the physiological response of hermatypic scleractinians to higher pCO_2 is critical to predict the future of coral reefs. Our aim is to investigate key aspects of the coral holobiont physiology: calcification, photosynthesis efficiency and nutrients assimilation. Two *Acroporidae* (*Acropora digitifera* and *Acropora muricata*) and two *Pocilloporidae* (*Pocillopora damicornis* and *Seriatopora hystrix*) are studied in original, patented chemostats (total volume: 1.25L). They allow to maintain scleractinians in controlled and monitored environment (temperature 26±0.1 °C, salinity 34±0.1, total alkalinity 2.40±0.02 meq.kg-1,[N] 1±0.5 µmol.L-1,[P] 0.4±0.2 µmol.L^{-1},12h/12h light/dark phases, 250 µE.m^{-1}.s^{-2}). Four replicates for each species are placed in two contrasted pH (8.05+-0.02 & 7.80+-0.02) during a 24h period. Complete balance of photosynthesis, respiration, calcification, CO_2 fluxes and nutrients assimilation is calculated every four hours. PSII complex efficiency is also estimated by pulse amplitude modulation (PAM) fluorometry.

Under current pCO_2, we observe equilibrium between net photosynthesis and dark respiration for each species: primary production by zooxanthellae is high enough to sustain the metabolism of the holobiont, including its high calcification rate. At short term and under higher pCO_2, calcification rate is not affected, but we observe a clear change of carbon fluxes, that is, a decrease in net photosynthesis, and higher dark-phase respiration rate. Nutrients assimilation, which occurs primarily during the light-phase, is also affected: a decrease is observed both for N and P. Experiments after a longer acclimation phase are planned to assess if there is any recovery of the equilibrium after adjustment of symbioses to the lower pH conditions.

* Corresponding author: Julien.Leblud@umons.ac.be

[1]Laboratory of Numerical Ecology of Aquatic Systems, Mons University, 20 place du Parc, B7000, Mons, Belgium

[2] Laboratoire de Biologie Marine, Université Libre de Bruxelles, CP 160/15 avenue F.D. Roosevelt, B1050, Brussels, Belgium