Microorganisms suitable for studying biomarkers within the atmosphere in a test tube project

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Within the atmosphere in a test tube project, we are performing laboratory simulations trying to replicate the environmental conditions of an Earth-like planet orbiting around the mean habitable zone of an M star in order to understand what kind of biomarkers could be revealed by different biotypes, if present, living therein. We'll analyze the O_2 and CO_2 photosynthetic balance as well as the pigment composition and the absorption and reflectance spectra of different organisms, mainly microalgae, bacteria and mosses, when exposed to a lamp reproducing an M star spectrum. In particular we will consider both model and atypical photosynthetic organisms. Between the model ones the moss *Physcomitrella patens*, the green microalga *Chlamydomonas reinhardtii* and the cyanobacterium *Synechococcus* PCC 7002 will be tested. All of them are characterized by the presence of chlorophylls (chlorophyll a and b) with an in vivo absorption major peak in the Red (around 680 nm). We also selected a series of other peculiar photosynthetic microorganisms able to extend their in vivo absorption to the NIR (around 710 nm), due to particular rearrangement of the chlorophyll a in their photosystems or to the presence of other chlorophyll forms (chlorophyll d and f). To this second group of organisms belong the microalga *Orstreobium* sp. and the cyanobacteria *Acaryochloris marina*, *Halomicronema hongdechloris* and *Chlorogloeopsis fritschii*.

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