Exploring marine microbial adaptive strategies in an atmospheric simulation chamber: implications for biogeochemical C cycle along the ocean-atmosphere continuum

Elena Peresani[1], Elena Gatta[2], Virgina Vernocchi[2,3], Federico Mazzei[2,3], Paolo Prati[2,3], Fabrizia Gionechetti[1], Alberto Pallavicini[1], Cecilia Balestra[4], Viviana Fonti[4], Valentina Esposito[4], Cinzia De Vittor[4], Mauro Celussi[4], Francesca Iacuzzo[5], Francesca Malfatti[1]

[1]Life Sciences Department, University of Trieste, Italy. [2]Physics Department, University of Genova, Italy. [3]INFN - National Institute for Nuclear Physics, Genova, Italy. [4]National Institute of Oceanography and Applied Geophysics - OGS, Trieste, Italy. [5]Biology Department, University of Naples "Federico II", Italy.

Ocean and atmosphere constantly exchange water, gases and microbes. Microbial activities in the ocean have profound influences on the atmospheric chemistry and on Earth climate. Marine microbes are important players in the biogeochemical C cycle at the planetary level, despite living in a dynamic microscale world. We are at the infancy of understanding adaptive strategies of marine microbes while ejected into the sea spray aerosol, SSA. This work is part of a project investigating the diversity of microbial communities, in the shallow hydrothermal vents of Panarea (Mediterranean Sea) across the ocean-atmosphere continuum. We isolated several microbial strains present in seawater as well as in SSA. To mimic ocean-SSA ejection, we conducted aerosolization experiments at the atmospheric simulation ChAMBRe (INFN, University of Genova) on BP1 strain, a yellow-pigmented monoderm belonging to *Microbacterium* genus, isolated from Black Point hydrothermal fluid. BP1 was exposed, at 60% RH for 1 hr, to light, dark, black carbon particles and NOx gases. Changes in cultivability, particle and cell abundance were monitored using real-time bioaerosol sensing instrument (WIBS), flow cytometry, and culture-based approaches. Overall, the stress in the atmosphere affected particle abundance and cultivability in a treatment-specific way. Unexpectedly, BP1 in the light showed an increase in cell abundance but not in the dark and black carbon conditions. I will discuss my results in the light of the importance of environmental stressors role in shaping airborne microbial communities, with implications for global biogeochemical cycles.