MICROBIAL MATS IN SULPHIDIC SPRINGS AS WINDOWS INTO ANCIENT ECOSYSTEMS. J. M. Klatt[1], D. de Beer and L. Polerecky[2], [1]Max-Planck-Institute for Marine Microbiology, Cesiusstr. 1, 28357 Bremen, Germany, [2] Department of Earth Sciences – Geochemistry, Faculty of Geosciences, Utrecht University, Budapestlaan 4, 3584 CD, Utrecht, The Netherlands.

Microbial mats covering sediments and rocks in the Frasassi sulphidic springs, Italy, represent an ancient ocean analogue ecosystem. The main mat architects are large chemosynthetic sulphur oxidizing bacteria and versatile cyanobacteria capable of both sulphide-driven anoxygenic photosynthesis and oxygenic photosynthesis. We studied the activity of these two main functional groups *in-situ* using microsensors and in lab-based experiments with cyanobacterial isolates [1][2]. Based on our measurements we conclude that ecosystems driven by a fluctuating energy source do not necessarily develop towards optimal energy usage. Specifically, the biogeochemical cycling and energy utilization efficiency in such ecosystems can only be understood when considering (i) the dynamism of the external energy source (light), (ii) the kinetic regulation of the microbially mediated processes and (iii) specific adaptations (e.g., migration) of individual inhabitants of the system. The unintuitive coupling of oxygen and sulphur cycling in the Frasassi microbial mats provides alternative perspectives onto how Proterozoic redox chemistry might have been modulated by microbial activity.

References: [1] Klatt, J.M., Al-Najjar, M.A.A., Yilmaz, P., Lavik, G., de Beer, D., and Polerecky, L. (2015) *Appl. Environ. Microbiol.* AEM.03579–14 [2] latt, J.M., Haas, S., Yilmaz, P., de Beer, D., and Polerecky, L. (2015) *Environ. Microbiol.*