11:10 – 11:40 MICROBIAL DETERIORATION OF MAYAN STONE BUILDINGS AT UXMAL, YUCATAN, MEXICO. O. Ortega-Morales [1], G. Hernández-Duque [2], P. Jozsa [3], W. Sand [3], P. Crassous [4], and J. Guezennec [1]. 1. DRV/VP/Laboratorie de Biotechnologie, 4. DRO/EP/Laboratorie de Microscopie, IFREMER, Brest, 29280, Plouzane, Francia. 2. Fac. Ingeniería, Universidad del Mayab, Carr. Merida-Porgreso Km. 15.5, Cordemex, 97310, Merida, Yucatan, Mexico. 3. Abteilung Mikrobiologie, Universitat Hamburg, Obnhorststrasse 18, D-22609, Hamburg, Alemania.

The microbian communities asociated to Uxmal Mayan monuments (Yucatan, Mexico) and their role in stone deterioration were preliminary characterized by chemical, biochemical, microbiological, microscopical and surface analysis methods under two climatic seasons (1997). The organic matter and organic carbon and nitrogen were in the range of those reported for other stone buildings, indicating that oligotrophic conditions prevail at Uxmal. Quantitative differences in microbial biomass was higher at indoor section were the organic matter content was the highest and the micro-environmental conditions (availability of water and protection to direct sun light) are more suitable for microbial growth. The microbiological analysis underestimated the microbial biomass, as revealed by biochemical approaches. Nitrate and nitrite-oxidazing, metilotrophic and heterotrophic bacteria and fungi were detected in most surfaces. The heterotrophic bacteria were the most abundant microbial group (microbiological data). However, the chorophyll profiles and scanning electron microscopy (SEM) showed that the microalgae are the most abundant colonizers in Uxmal stone buildings. EDAX analysis showed that the most surfaces were covered by an organic layer (cells and exopolymers). Gypsum was found in few samples. The large phototrophic biomass seems to play a role in stone biodeterioration by supporting growth of heterotrophic microorganisms (bacteria and fungi) which are known to produce organic acids, leading to calcite dissolution and cations chelation. Further studies are being carried out in order to determine the role of exopolysaccharides which are thought to play a role in chemical degradation of limestone substrates in Uxmal.