

## Summary of the discussion Workshop 1 (moderator D. Ariztegui)

### Processes in the subsurface biosphere and their role in preserving and/or changing environmental signals in the sediment record

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Microorganisms are in terms of biomass the most important biological forms in all ecosystems. However, it is surprising how little we know about their diversity and function. This is especially the case for the subsurface biosphere, a system that has been studied for several years in the marine realm from a geological perspective, but that is almost unknown from a biological point of view. The discussion in this workshop was particularly centered in the lacustrine subsurface biosphere and clearly identified the need for more interdisciplinary work. It appears that a closer collaboration between geologists and microbial ecologists is critical to improve our understanding of the past and present role of microorganisms on the lacustrine subsurface biosphere.

For many years it has been clear that we still have a fragmented view of microbial diversity even in the most studied systems (e.g., soils). This is mainly due to the fact that only a very small fraction of microbes can be cultured in the laboratory, making culture-dependent techniques heavily biased. This has prompted the development of several culture-independent approaches based on the direct detection of biomarkers from environmental samples. The limitations of these methodological approaches were discussed. Some of the questions discussed included: is it relevant to study total bacteria or archaea, or shall we rather focus on specific functional groups? How can we assess microbial activity *in situ*? What are the signals archived in the sediments that can be used as biomarkers of past or ongoing microbial activity? How to deal with the problem of contamination of the samples? What is the role of microorganisms in mineral authigenesis and diagenesis? What is the importance of combining as many disciplines as possible to obtain better results?

Although many of the points addressed in the workshop will be still polemic in the future, the most relevant conclusion is the need for an interdisciplinary work in order to obtain as many metadata as possible, in order to assist the interpretation of the biological patterns observed. All these elements point towards the importance of including microbial ecology as one of the strategic areas for future research developments at the Forel Institute.