Assessing the divide between microbial surface reactivity of cultures grown *in vitro* and communities gathered from the field using potentiometric titrations and Cd adsorption experiments

T. J. WARCHOLA[1]*, S. L. FLYNN[1], L. J. ROBBINS[1], Y. LIU[1], T. GAUGER[2], M. S. ALAM[1], R. A. MYERS[1], O. KOVALCHUCK[1], S. WEI[1], A. KAPPLER[2], D. S. ALESSI[1] AND K. O. KONHAUSER[1]

[1]1-26 Earth Sciences Building, University of Alberta, Edmonton, Alberta, Canada, T6G 2E3 (*correspondence: warchola@ualberta.ca).
[2]Universität Tübingen, Angewandte Geowissenschaften, Hölderlinstraße 12, 72074 Tübingen, Germany.

For nearly four decades researchers have investigated the surface reactivity and metal adsorption characteristics of microbial surfaces. These studies have generally utilized coupled potentiometric titration and metal adsorption experiments. Subsequently, the results are used in conjunction with surface complexation models, the ultimate goal being to quantitatively assess the impact of reactive surface ligands on metal concentrations in natural environments. These models are typically based on data gathered using microbes cultured *in vitro*. However, a major concern with this procedure is that it neglects to consider the implications of environmental factors, such as concomitantly occuring mineral precipitates on the metal sorption capacity of microbes. The purpose of this study was to assess the impact of carbonate mineral precipitates on microbial surface reactivity in a field setting, relative to those cultured *in vitro*. Three sets of potentiometric titrations and metal sorption experiments were carried out on three groups of samples: (1) microbes cultured *in vitro*, (2) samples of only carbonate minerals gathered in the field, and (3) samples containing a mixture of microbes and carbonate minerals. This allows for a comparison assessing the relative contributions to the surface reactivity of the two end-members versus the mixture characteristic of natural environments. Preliminary results show that field samples are much more chemically reactive and bind more metal than samples cultured *in vitro*. The majority of this increase is attributed to the reactivity of carbonates present in the sample. When considering purely microbe-metal interactions, *in vitro* cultures appear to overpredict metal binding capacity of microbial mats in natural settings.