

Potential impacts of climate change on biogeochemistry of mine wastes and efficiency of organic covers

ASMA ASEMANINEJAD, TED MACKINNON AND SEAN LANGLEY

Natural Resources Canada

Presenting Author: asma.asemaninejad@canada.ca

Mine environments in boreal and sub-boreal zones are expected to experience extreme weather events, increases in temperature and shifts in precipitation patterns. Organic covers on mine tailings have been identified as potentially vulnerable to climate change through the climate-driven shifts in microbial communities and activities in the covers, and the concern is how this may affect long-term functionality of the covers and tailings geochemical stability. Mesocosm experiments were set up to simulate climate change conditions projected by IPCC for different seasons in sub-boreal zones of Canada. We used a factorial design and system biology approach, integrating tools in microbiomics, metagenomics, geochemistry, and mineralogy to study the impacts of multiple and interacting climate change stressors (temperature and hydrology) on systematic properties including microbial communities and functional traits, geochemical properties, and their dynamic interactions within the biological system subjected to the simulated climate change conditions. This study aims to identify associations of climate driven-shifts in microbial communities and functions with changes in geochemistry of organic covers and underlying tailings and the potential for cascading changes at the ecosystem level from terrestrial to aquatic environments. In this poster, we will outline our experimental design and approach, and discuss how these observations will help to improve the efficiency and viability of mine tailings remediation/restoration strategies under a changing climate.