



Color characterization of Arctic Biological Soil Crusts

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Global climate change makes large areas lacking the vegetation coverage continuously available to primary colonization by biological soil crusts (BSCs). This happens in many different environments, included high mountains and Polar Regions where new areas can become available due to glaciers retreat. Presence of BSCs leads to the stabilization of the substrate and to a possible development of protosoil, with an increase of fertility and resilience against erosion. Polar BSCs can exhibit many different proportions of cyanobacteria, algae, microfungi, lichens, and bryophytes which induce a large variability of the crust morphology and specific ecosystem functions. An effective and easy way for identifying the BSCs in the field would be very useful to rapidly recognize their development stage and help in understanding the overall impact of climate change in the delicate polar environments.

Color analysis has long been applied as an easily measurable physical attribute of soil closely correlated with pedogenic processes and some soil functions. In this preliminary work we used RGB and CIE-L*a*b* color models in order to physically characterize fourteen different BSCs identified in Spitsbergen island of Svalbard archipelago in Arctic Ocean at 79° north latitude. We found that the “redness parameter “a*” of CIE-L*a*b* model was well correlated to the succession process of some BSCs at given geomorphology condition. Most of color parameters showed, moreover, a great potential to be correlated to photosynthetic activity and other ecosystem functions of BSCs.