

This is an interesting paper which describes epilithic phototrophic biofilms on a cultural heritage monument in Beijing, the Temple of Heaven. These biofilms have the potential for bioweathering, i.e. the degradation/dissolution of lithic structures such as marble.

Although the paper is generally well written I have the following critical comments:

As the paper is focused on cyanobacterial biofilms avoid the term “alga/e”. Cyanobacteria are prokaryotes and NOT eukaryotic algae!

introduction should be more condensed, in particular the historical aspects of the Temple of Heaven since the focus is bioweathering by phototrophic biofilms. In addition, although I acknowledge many Chinese colleagues working on bioweathering/biodeterioation problems, more colleagues from Europe should be cited, as they were studying such problems already in the 90ies.

Figure 2 – data set stops in 2011 – I think more recent data should be included since particularly during the last decade many meteorological changes due to global warming can be documented

Methods – I deeply doubt species identification, because most of the cited literature is outdated and because cyanobacteria are extremely difficult or even impossible to identify based on morphology only. These days, you need molecular-genetic data (16S rDNA or other specific markers) to prove identity. In addition, taxonomic assignments (“species names”) regularly change, and hence a data base (e.g. AlgaeBase) has to be consulted before submission of a manuscript. Perhaps to overcome the taxonomic problems the author might consider to always stick to the genus level only, and NOT to mention species.

3.1 change “population distribution” to “community distribution” (population represents genotypes of the same species!), and throughout the whole manuscript.

Line 190/191 – do not discuss your data in the results

3.2 change “Biological Population Distribution” to “community distribution” and throughout the whole manuscript

Line 213 – do not discuss your data in the results

Fig. 5a/b – delete Chinese letters

Fig. 7 e/f, 9f are of bad quality, and taxa can not be identified!

Table 1 and 2 – although environmental data are very important for such a study, there are real data missing. Less or more sunlight does not tell the reader anything - real data instead would help! What was the temperature in the sun or at shaded sites?

Fig. 18 – very nice!

In the discussion I miss more European studies. See also the recent papers of Patrick Jung on bioweathering mechanisms of rocks in the Atacama desert by cyanobacteria and cyanolichens!

My general recommendation is as follows:

The topic is interesting and addresses the scope of the journal. Biological vocabulary/wording has to be carefully modified (see my comment on population). Focus on cyanobacteria.

Identification/taxonomy is highly questionable (see my comments). The macroscopic description of the biofilms is well done. Microscopic images of the cyanobacteria are not always of appropriate quality. Real environmental data should be provided. English grammar and expression is fine. I think the whole manuscript could be condensed (e.g. historical aspects in the introduction, number of figures etc.).

I recommend a major revision