**Interactive comment on** “The composition of endolithic communities in gypcrete is determined by the specific microhabitat architecture” by María Cristina Casero et al.

Anonymous Referee #3

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This work focuses on documenting the composition and distribution of microorganisms within endolithic habitats in gypcrete in the Atacama Desert. It aims to test the hypothesis that specific microhabitat architecture influences microenvironmental conditions and therefore the relative abundance of different microorganisms within these habitats by using a combination of microscopy and molecular techniques.

The manuscript provides new and interesting information about microbial (relative) abundances within these habitats, and adequately explains how these habitats differ in terms of their physical architecture. For these reasons, I believe it is suitable for publication in Biogeosciences after considering the following comments:
Abstract: suggesting that the lithic substrate “might” be an essential factor does not in-
still confidence in the results and conclusions, which contrasts with the term “confirms”
in the Conclusions. In addition, the abstract should be more concise in describing the
results of this work, not general observations of the results. For example, it currently
points out that the hypoendolithic community was the least diverse and hosted unique
taxa; explaining “why” here is important for the reader.

What is the significance of “Preandean Atacama Desert” within the context of this
study?

Section 2.2: It is unclear how this climate data is directly relevant to the results of
this manuscript. Other than thermal measurements, it does not appear to have been
collected specifically for this work and so only needs to be mentioned in the Discussion.

Section 2.5: Title should include “DNA extraction procedures” to be consistent with
Section 2.6.

Section 3: Results – Lines 139-141 are not necessary, nor is Section 3.1 with excep-
tion of gypcrete surface temperatures if they were measured for this study.

Section 3.3: Use present tense to describe observations, such as “. . .colonization zone
is close . . .”

Section 4: What is the distance between the cryptoendolithic/chasmoendolithic habi-
tats in the upper part of the substrate and the hypoendolithic habitat in the lower part
of the substrate? Are they separated by millimetres? Centimetres?

Line 21 – “. . .a combination of microscopic investigations and . . .” Line 22 – “. . .the en-
dolithic communities and their habitats at the microscale . . .” Line 23 – replace “lithic
substrate” with “gypcrete” Line 39 – replace “noticeable” with “plausible” Line 39 –
“. . .only by microorganisms that can survive and/or thrive under physical or geochemi-
cal extremes such as temperature . . .” Line 43 – replace “stress” with “limitations” Line 45
– “. . .able to survive under such conditions” Line 46 – “The Atacama Desert . . .on Earth,
should be “EPS” Line 300 – see line 297 Line 302 – “The aggregate-like structure…” Line 303 – “…and heterotrophic bacteria also helps…” Line 308 – “…in such an oligotrophic environment.” Line 330 – can you provide a reference that would support the statement that light intensity should be considered a crucial factor in understanding differences in community composition between top and bottom habitats? Line 342 – replace “unidentification” with “lack of positive identification” Line 353 – Replace “confirmed” with “hypothesized”; I would not say that this work confirms that liquid water availability is a driver of community composition, as no experimental evidence was provided in the manuscript to substantiate this claim. A more convincing argument for how microenvironmental conditions determines microbial distribution would strengthen the manuscript. Line 369 – “…draw conclusions…”

Figure 1 – Latitude and longitude markers should be included in the study are map Figure 3 – It would be helpful to point out what samples are polished blocks/thin sections vs whole mounts for SEM work.