

Sulfate-reducing bacteria in Mediterranean lagoons: similarities and disparities between the different biogeographic areas

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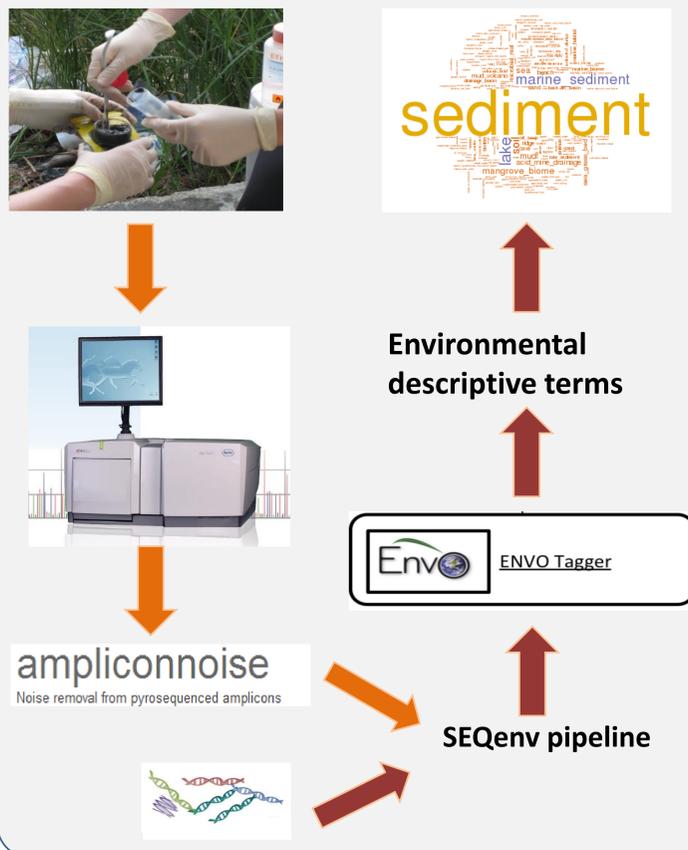
Introduction

Lagoons are naturally enriched habitats, with unstable environmental conditions caused by their confinement from the sea and their shallow depth. Such ecosystems are characterized by increased hypoxia and high concentrations of hydrogen sulfide.

The continuous drop in the associated costs combined with the increased efficiency of the latest high-throughput sequencing technologies has resulted in an unprecedented growth in sequencing projects. However, despite the vast availability of sequence data for microorganisms, little is known on the ecological features and processes prevailing on the ecosystems they have been found, especially since most of them can only be characterized as “uncultured”.

The aim of the study was to examine the sulfate reducing bacterial community in the lagoonal sediments of the Amvrakikos Gulf (Ionian Sea, Western Greece) and to compare it with the communities reported from similar environments, using the novel pipeline, *SEQenv*, for the annotation of the sequences with environment descriptive terms.

Methods



Conclusions

- ❖ There is a spatial diversity pattern of the bacteria found in the lagoonal complex of the Amvrakikos Gulf.
- ❖ Each lagoonal community is annotated with different environmental descriptive terms, at least as their abundance is concerned.
- ❖ This may indicate that the communities have, to some extent, different sources of origin.
- ❖ The Amvrakikos Gulf lagoons are associated with environmental descriptive terms that are not found in similar environments.
- ❖ This may be due to the limited number of *dsr* sequences at the NCBI database and to incorrect annotation during sequence submission.

Results

16S rRNA:

As expected the most abundant environmental terms that characterize the samples are *sediment* (ENVO: 2007) and *marine sediment* (ENVO: 2113). Among the environmental descriptive terms found in all the samples were *sea* (ENVO: 16), *lake* (ENVO: 20), *mangrove* (ENVO: 1000181) and *soil* (ENVO: 1998).

However, only samples from Rodia and Tsoukalio lagoons were associated with *fresh water* (ENVO: 2011) and only in samples from Rodia was the term *lake sediment* (ENVO: 546) found.

Interestingly, the term *beef* (ENVO: 3067) was found in Tsopeli and Tsoukalio lagoons which may suggest that they are influenced from the adjacent meat producing factories.

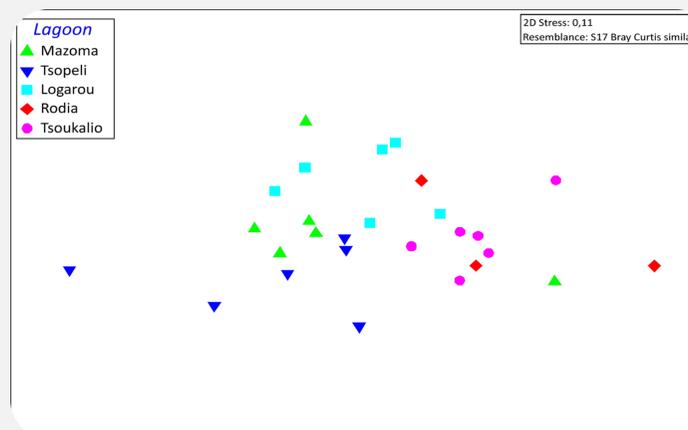
dsr:

The terms *sediment*, *acid mine drainage* (ENVO: 1997) and *aquifer* (ENVO: 12408) were found in all the samples.

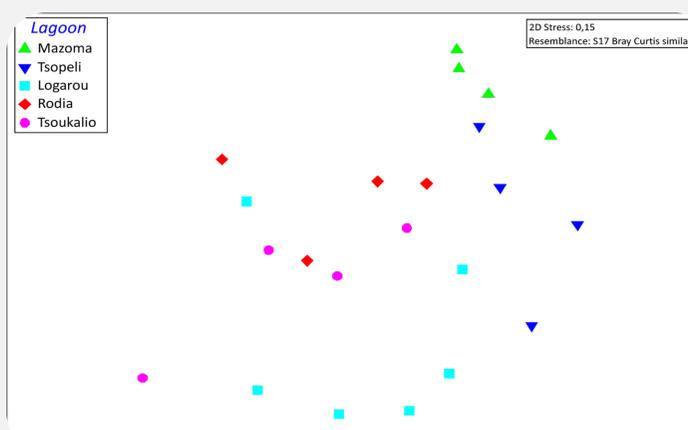
The lagoons Rodia and Tsoukalio were the only ones associated with *gold mine* (ENVO: 2168) and *borehole* (ENVO: 2226).

The term *biofilter* (ENVO: 2152) was only found in Mazoma and Logarou lagoons.

Logarou lagoon differentiated also because the terms *drainage basin* (ENVO: 291) and *back-arc basin* (ENVO: 2277) were found to be associated only with its bacterial communities.



ANOSIM (Factor: Lagoon)
R = 4; p = 0.001



ANOSIM (Factor: Lagoon)
R = 0.526; p = 0.001

Results

Comparison with *dsr* sequences downloaded from NCBI:

80% of the ENVO terms of the Amvrakikos Gulf *dsr* sequences were not found in NCBI sequences characterized as *lagoon* or *brackish* or *lake*.

Unique terms of the Amvrakikos Gulf sequences include *bay* (ENVO: 32), *fjord* (ENVO: 39), *hydrothermal vent* (ENVO: 215), *harbor* (ENVO: 463), *brewery* (ENVO: 3885) and *peat soil* (ENVO: 5774).



Figure 1: a. Geographical location of the study area. b. Map of the lagoons under study indicating the stations sampled.

ENVIRONMENTS project

SEQenv pipeline

Environment Ontology