PhD Student Poster Contest

SEDIMENTS OXIDATION BY SEAGRASSES: INFLUENCE ON THE S CYCLE IN *POSIDONIA OCEANICA* (L.) DELILE INTERMATTES DYNAMIC

Arnaud Abadie[1,2,3], Pierre Lejeune[2], Gérard Pergent[3], Sylvie Gobert[1]

[1]MARE Centre, Laboratoire d'Oceanologie, University of Liege, Belgium
[2]STARESO Research Station, France
[3]EqEL – FRES 3041, Universite de Corse, France

1. Framework

The Mediterranean seagrass *Posidonia oceanica* plays an important role in controlling coastal belowground biogeochemistry, in particular by oxidizing sediments through the release of O_2 by roots. This process allows creating more suitable condition for plant growth and colonization (**Fig. 1**). The lack of H_2S oxidation in SO_4^{2-} and its intrusion into the plant tissues can lead to a limitation of the plant development or its regression **[1]** and so creating, entertaining or extending gaps, or "intermattes", in continuous meadows. In this study we aim to obtain a better understanding of the role played by sediments biochemistry in natural and anthropogenic intermattes dynamic. We chose to focus on the S cycle and the H_2S potential effects on the surrounding meadow.

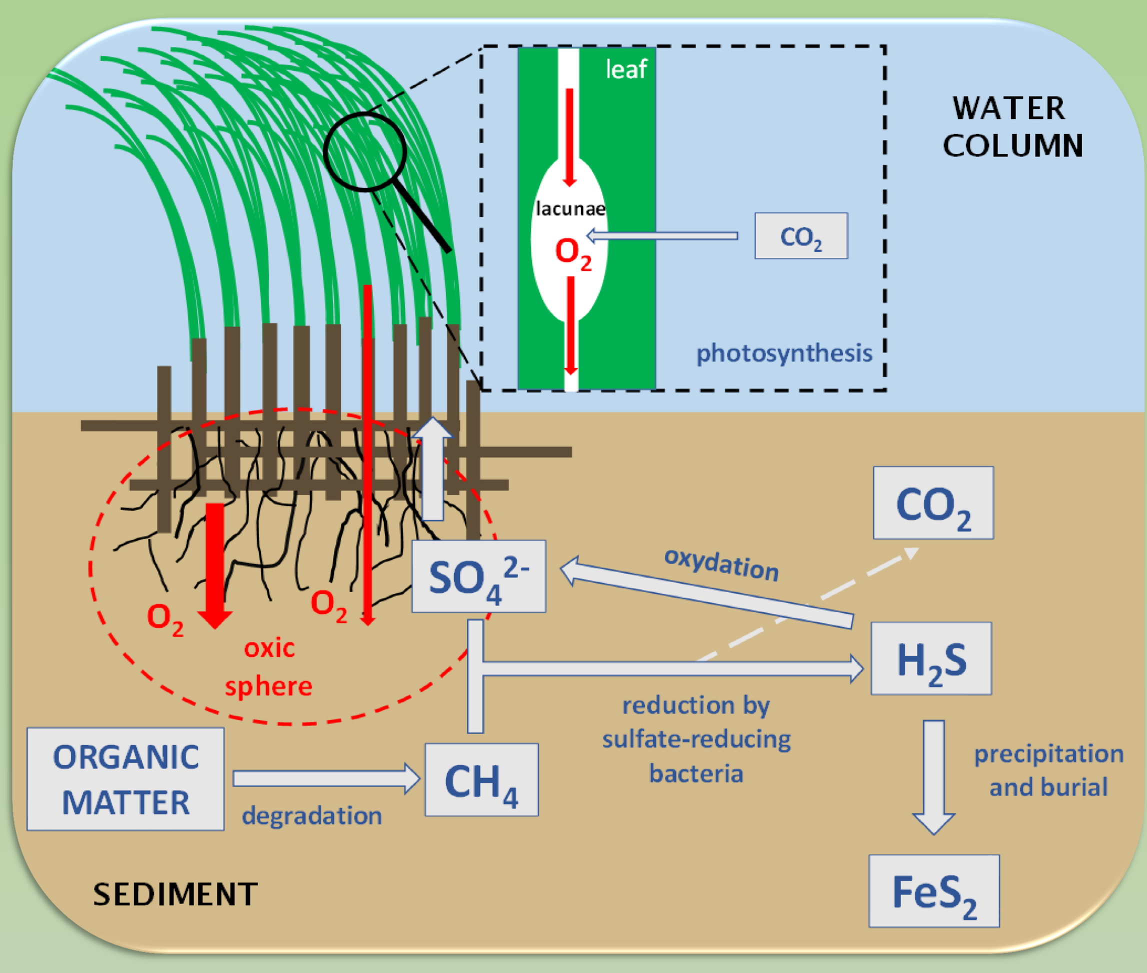

Fig. 1. sediments oxidation through *P. oceanica* roots and S cycle in sediments

What is an "intermatte"?

Intermatte: a patch of sand (**Fig. 2a**) or "dead matte" (Posidonia rhizomes that have lost their leaves) (**Fig. 2b**) inside the meadow **[2]**

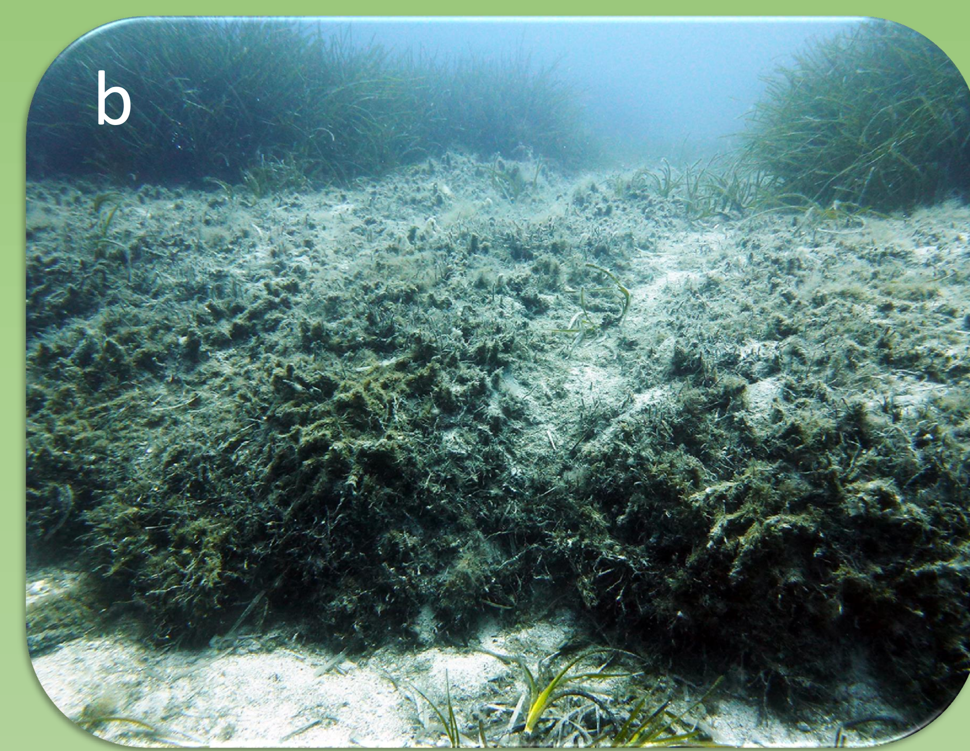

Fig. 2. a. a natural sandy intermatte with a crashed cliff of "matte"; **b.** an anthropogenic intermatte with "dead matte" generated by anchoring and often colonized by *Caulerpa racemosa* var. *cylindracea*

2. Study site

The study takes place at Calvi Bay in Corsica (France) nearby the research station STARESO in an intensive anchoring area: the Alga Beach (**Fig. 3**).

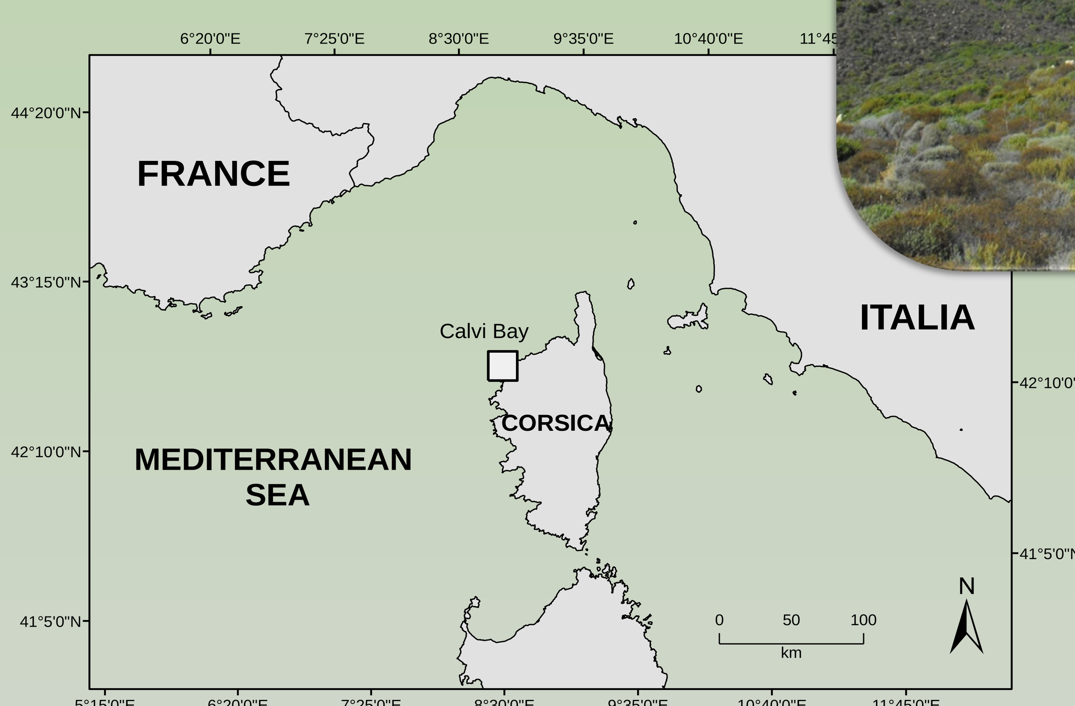

Fig. 3. Alga Beach in Calvi Bay (Corsica, France): an anchoring area for various sizes of boats

3. What do we measure in sediments?

Field samplings start in May 2014 and will be carried out in different seasons until 2016:

- Sediments grain size
- Total alkalinity
- Red/Ox potential
- pH
- Organic matter contents
- SO_4^{2-}, H_2S, O_2, CO_2, CH_4 and N_2O concentration

Samples are collected at different depths (-10 m, -15 m and -20 m) in order to take into account the anchoring effect of various sizes of boats.

4. Hypothesis on processes studied

A natural process initiated by waves action (**Fig. 4**).
The carbonate sediments in the middle, with low organic matter contents, favor oxidized conditions. The intermatte dynamic is mainly led by the hydrodynamism that erodes the matte cliff. On the other side the meadow colonizes the sandy bottom thanks to plagiotropic rhizomes.

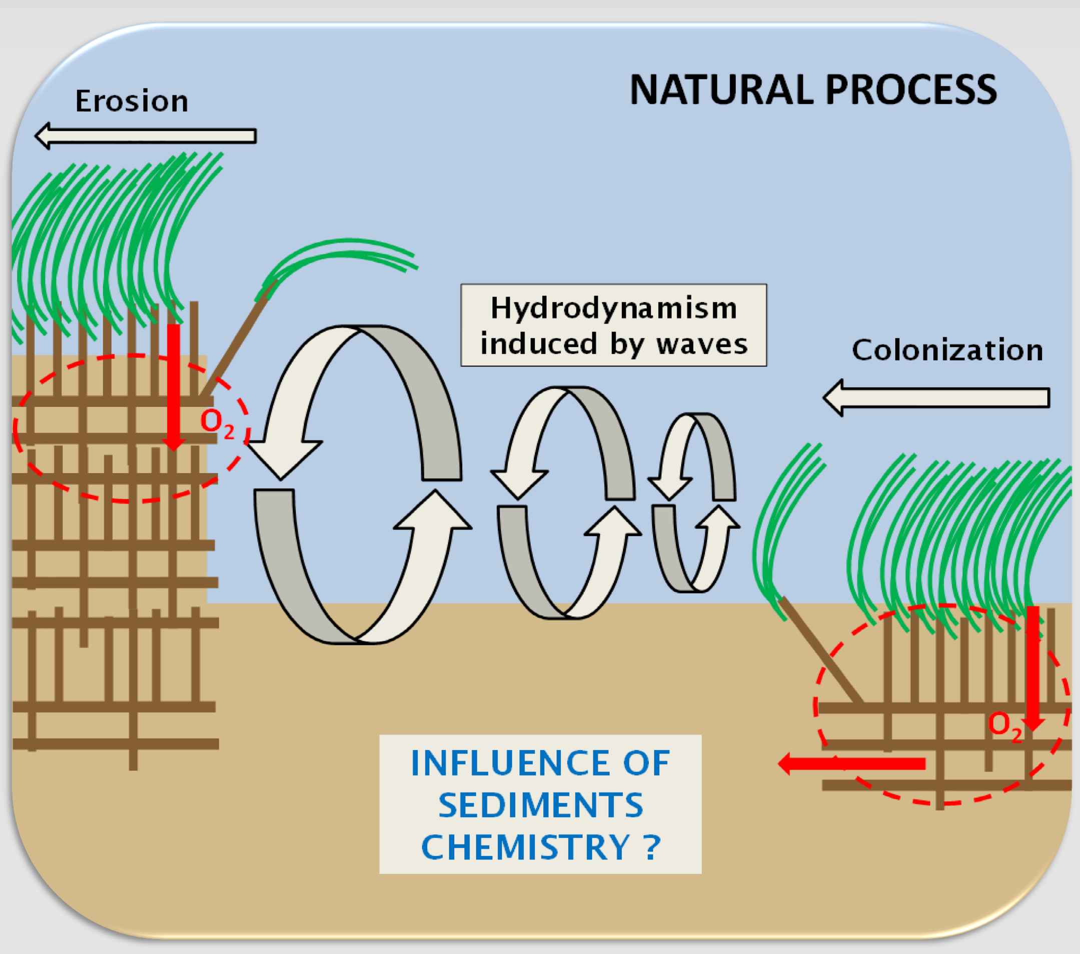

Fig. 4. Natural intermatte generation by waves hydrodynamism

An anthropogenic process initiated by intensive anchoring (**Fig. 5**).
Generated gaps are filled with fine sediments that can increase the organic matter load and create a reduced environment. The settlement of *Caulerpa racemosa* var. *cylindracea* on the dead matte may enhance the Sulfate Reduction Rate (SRR) and then favors the H_2S intrusion into adjacent plants. In some places it could lead to the dead matte area extension.

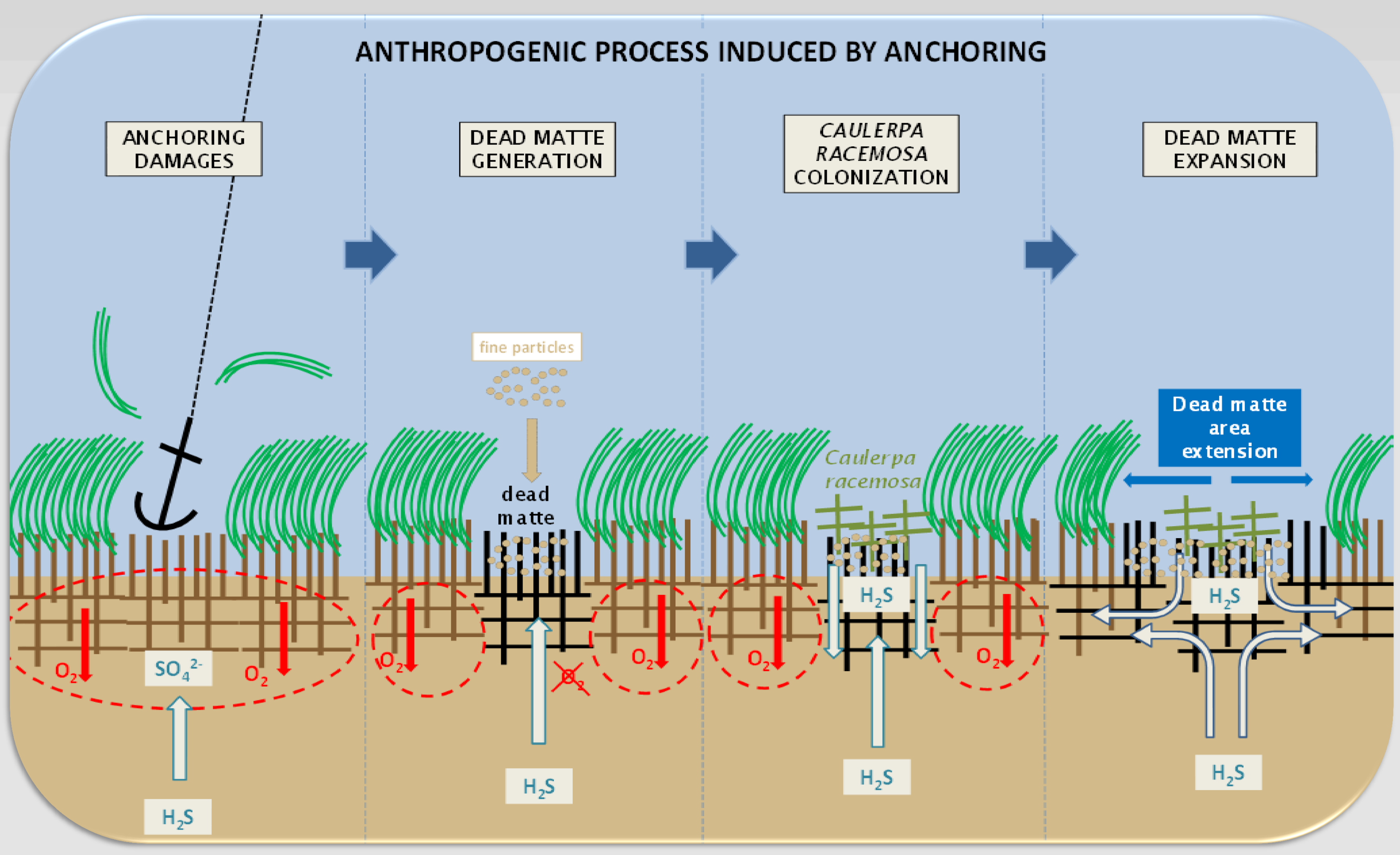

Fig. 5. Hypothesis on the influence of H_2S in *P. oceanica* meadows regression caused by intensive anchoring

For a PDF version of this poster please scan it

References

[1] Marbà N., Holmer M., Gacia E., Barron C. (2006). Seagrass beds and coastal biogeochemistry. Seagrasses : Biology, Ecology and Conservation. A. W. D. Larkum, R. J. Orth and C. M. Duarte, Springer. **1:** 135-157.
[2] Boudouresque C. F., Bernard G., Bonhomme P., Charbonnel E., Diviacco G., Meinesz A., Pergent G., Pergent-Martini C., Ruitton S., Tunesi L. (2012) Protection and conservation of *Posidonia oceanica* meadows. RAMOGE and RAC/SPA publisher, Tunis: 1-202.