Posidonia oceanica, a top producer of dimethylsulfoniopropionate and dimethylsulfoxide

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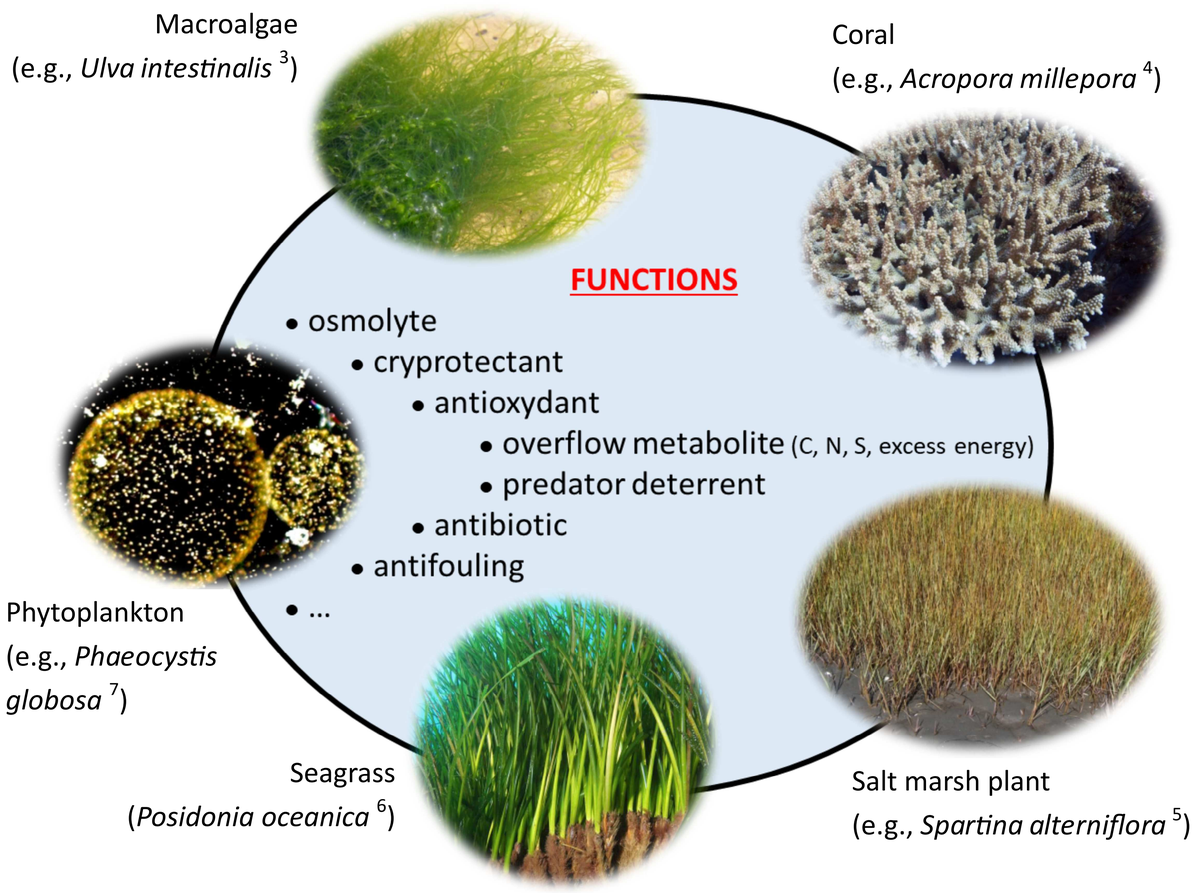
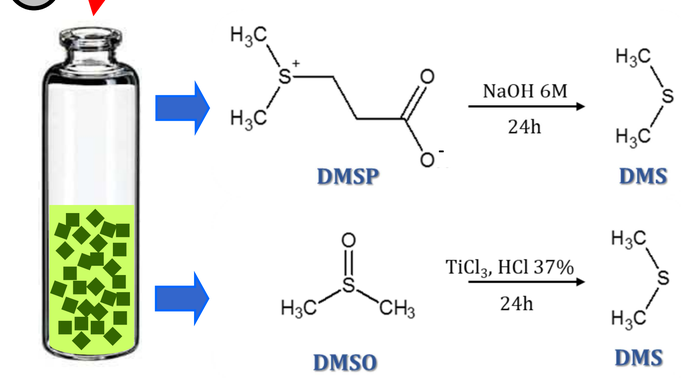
I - Introduction

- Dimethylsulfoniopropionate (DMSP) and related sulfonium compounds dimethyl sulfide (DMS) and dimethylsulfoxide (DMSO) constitute an integral part of the marine sulfur cycle [1].
- DMSP (and DMSO) has many 'potential' functions in marine autotrophs [2].
- The study of DMSP and DMSO in seagrasses is at its very beginning.

=> The main **objective** of this study was **to gain basic knowledge on the dynamics of DMSP and DMSO in** the seagrass ***Posidonia oceanica*** by the monitoring during 15 months, at 10m depth in a pristine meadow, of the leaf content of these molecules.

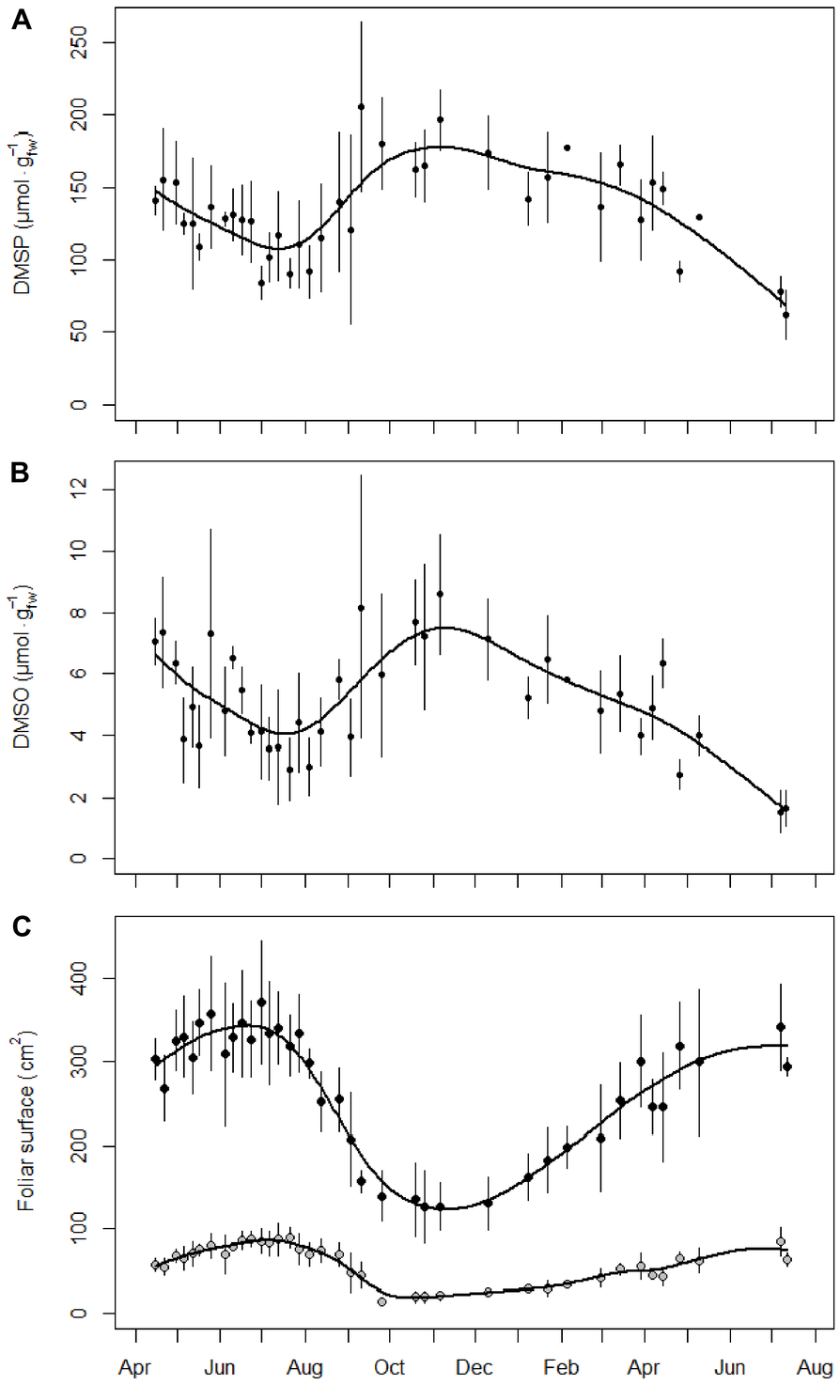


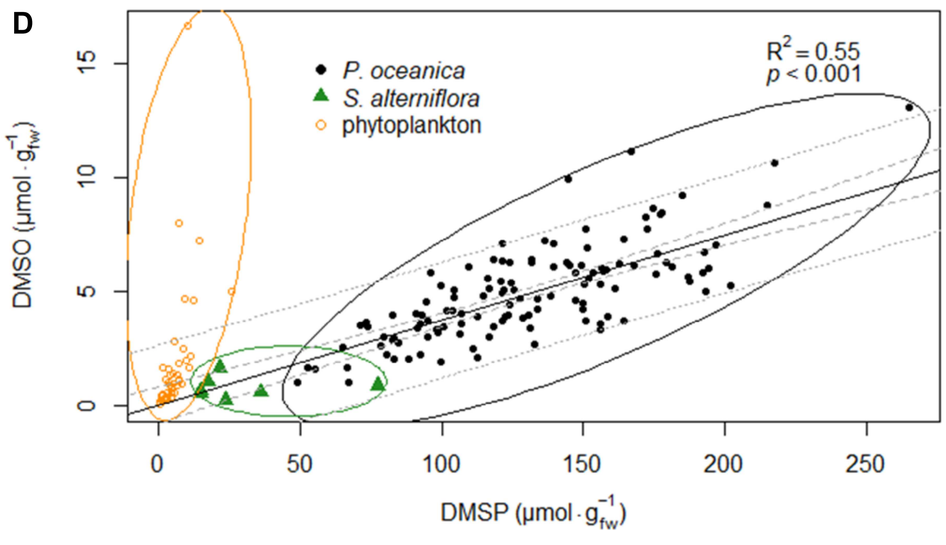
II - Material and methods



III - Results and discussion

- *Posidonia oceanica* is a top producer of DMSP and DMSO among marine autotrophs.
- The similar dynamic of the two molecule concentrations indicates that DMSO may result from the oxidation of DMS(P) [5,8].
- There is a close relationship between the seagrass leaf size, i.e., age and DMSP and DMSO concentrations, potentially indicative of :
  - ecophysiological roles, e.g., predator deterrent and antioxidant [2,8] ;
  - biochemical processes of nutrient regulation [9,10].
- The constant DMSP:DMSO molecule ratio could be useful as early generic indicator of stress in seagrasses, like suggested for *Spartina alterniflora* [8,11].





Right:
A) DMSP and B) DMSO concentrations (mean ± sd, n = 3) measured in *P. oceanica* leaves.
C) *P. oceanica* shoot (black circles) and intermediate leaf (grey circles) foliar surfaces (mean ± sd, n = 6).

Left:
D) Scatterplot of DMSP and DMSO concentrations in *P. oceanica* and *S. alterniflora* [5,8,11] leaves, and in phytoplankton [12].
E) DMSP:DMSO ratio (mean ± sd, n = 3) in *P. oceanica* leaves, bounded to October. The color gradient represents the expected decrease of the DMSP:DMSO ratio in seagrass leaves when exposed to stressors.

Ref.: [1] Stefels et al. 2007, Biogeochemistry. [2] Van Alstyne 2008, in: Algal Chemical Ecology. [3] Van Alstyne 2008, J Mar Biol Assoc UK. [4] Raina et al. 2003, Nature. [5] Husband & Kiene 2007, Wetlands. [6] Borges & Champenois 2015, Aquat Bot. [7] Speeckaert et al. 2018, Sci Total Environ. [8] Husband et al. 2012, Environ Exp Bot. [9] Giordano & Raven 2014, Aquat Bot. [10] Lepoint et al. 2002, J Sea Res. [11] Mc Farlin & Alber 2013, Mar Ecol Prog Ser. [12] Simó & Vila-Costa 2006, Mar Chem.

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