The stability of natural marine foams

Juliette Michaud[1], Léna Zig[2], Elsa Breton[3], Laurent Seuront[3], Florence Elias[1]

[1] Laboratoire Physique et mécanique des milieux Hétérogènes, CNRS, ESPCI Paris, Université PSL, SU, UP Cité, Paris, France
[2] Laboratoire Matière et Systèmes Complexes, UP Cité, CNRS, Paris, France
[3] Laboratoire d'Océanologie et de Géoscience, CNRS, Wimereux, FR
juliette.michaud@espci.fr ; florence.elias@univ-paris-diderot.fr

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The appearance of marine foam on coastlines can be observed all over the world. In particular, a remarkably stable and abundant foam is observed annually along the Opal Coast from April to June, often persisting for several days and reaching heights up to one meter (see Fig. 1a). The formation of this foam is always correlated with the accumulation in seawater ("a bloom") of a microalga called *Phaeocystis globosa* [1,2].

We aim to understand the reason for the ultra-stability of marine foams. In this presentation, we specifically study the role of algal proteins in the generation of this natural marine foam.

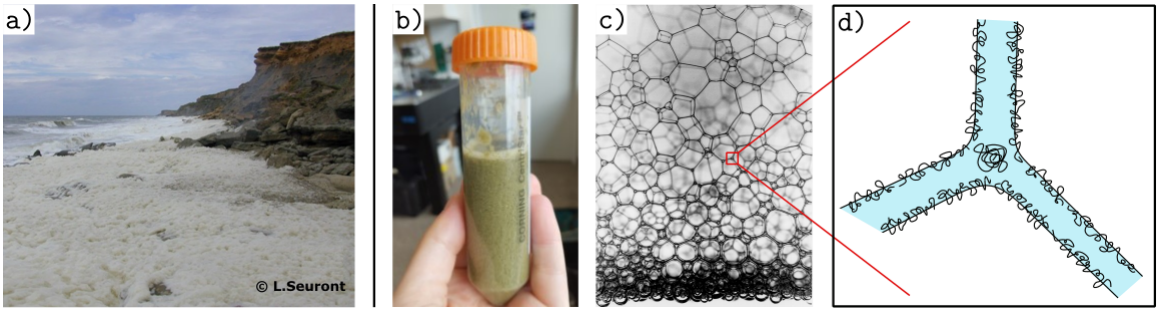

Figure 1. a) A foaming event b) Field samples c) Foam structure d) Proteins at the interfaces

A series of field samplings was carried out in spring of 2023. The marine foam was collected, and its liquid (see Fig. 1b) was stored for further analysis.

Back in the laboratory, we developed a method to identify and quantify the amphiphilic materials responsible for foam stabilization, based on knowledge of the physico-chemical properties of foams [3,4]. We "refoamed" the liquid using a controlled bubbling process and measured protein depletion in the liquid during foam generation. The results of this study suggest that algal proteins play a major role in foam stabilization.

Références

1. L. Seuront, D. Vincent & J.G Mitchell, *Journal of Marine Systems*, **61**, 118-133 (2006).
2. I. R. Jenkinson, L. Seuront & F. Elias, *Elementa : Science of the Anthropocene*, **6 :28** (2018).
3. J. Boos, W. Drenckhan & C. Stubenrauch, *Langmuir*, **28**, 9181-9906 (2012).
4. I. Cantat, S. Cohen-Addad, F. Elias, F. Graner, R. Höhler, O. Pitois, F. Rouyer & A. Saint-Jalmes, Foams. Structure and Dynamics, *trad. R. Flaman, Ed. S. Cox, Oxford University Press* (2013).