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The life and death of film bubbles S. POULAIN, The Fluid Dynamics of Disease Transmission Laboratory, Massachusetts Institute of Technology, E. VILLERMAUX, IRPHE, Aix Marseille University, L. BOUROUIBA, The Fluid Dynamics of Disease Transmission Laboratory, Massachusetts Institute of Technology — Following its burst, the fragmentation of a large bubble (film bubble) at the air-water interface can release hundreds of micrometer-sized film-drops in the air we breathe. This mechanism of droplet formation is one of the most prominent sources of sea spray. Indoor or outdoor, pathogens from contaminated water are transported by these droplets and have also been linked to respiratory infection. The lifetime and thickness of bubbles govern the number and size of the droplets they produce. Despite these important implications, little is known about the factors influencing the life and death of surface film bubbles. In particular, the fundamental physical mechanisms linking bubble aging, thinning, and lifetime remain poorly understood. To address this gap, we present the results of an extensive investigation of the aging of film-drop-producing bubbles in various ambient air, water composition, and temperature conditions. We present and validate a generalized physical picture and model of bubble cap thickness evolution. The model and physical picture are linked to the lifetime of bubbles via a series of cap rupture mechanisms of increasing efficiency.

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