



## Modelling the evolution of cryoconite holes

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Cryoconite refers to an organic-rich debris on glacier surfaces, commonly found to occupy holes that reach depths of centimetres or more. The holes provide sites where efficient microbial activity may occur to influence the chemistry of glacial environments. Although thermodynamic considerations suggest that the melt-enlargement of holes depends on the cryoconite's low albedo, other factors involved in hole formation remain poorly understood. Here we propose a mathematical model to study two aspects of this problem: (1) how each hole evolves in dimension under changing surface energy conditions, and (2) the spatial organisation of holes into colonies. We compare model results with observations on Midtre Lovénbreen, a polythermal glacier in Svalbard, to derive insights on the spatial dynamics of these systems.