



A prototype for the life cycle of a population of cold pools

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A theory for the equilibrium and time dependent behavior of a population of cold pools in a domain is presented. Starting from a given downdraft mass flux, an expression is given for the lifecycle of a single cold pool, and for the collective behavior of a population of cold pools. The fundamental assumption is that the generation of cold pools behaves like a space-time Poisson process. This allows to compute a density, a radius distribution and a time of disappearance for the cold pools. Also, it is possible to derive an expression for the probability of collision of two cold pools and to estimate a distribution of probability of the length of the collision front.

The theoretical prototype is compared to statistics of cold pool lifecycle obtained from a large domain LES. Results are discussed.