

The Cryosphere Discuss., author comment AC1
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Reply on RC1

Johannes Oerlemans et al.

Author comment on "Brief communication: Growth and decay of an ice stupa in alpine conditions – a simple model driven by energy-flux observations over a glacier surface" by Johannes Oerlemans et al., The Cryosphere Discuss.,
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The manuscript of Balasubramanian et al. (2021) has been withdrawn and will be submitted later in a different form with more emphasis on comparison of calculations with ice volume estimates of different ice stupas. The present brief communication is therefore very useful to set the stage and define the physical principle of an ice stupa by focusing on orders-of magnitude of the energy exchange processes with a minimum of modelling complexity.

The 'roughness/exposure' parameter: It is very hard to base estimates of this parameter on information in the literature. Boundary-layer meteorologists have of course studied the effect of obstacles in boundary layer flow (e.g. trees, but also buildings), but always in an ensemble setting, looking at the bulk effect of an ensemble of obstacles. In our case we have a case of a single obstacle in open terrain, and we are sure that the roughness of the surface and the exposure will lead to larger turbulent fluxes. Admittedly, we have no solid data or results from the literature that can back up our estimate of the roughness parameter.

And yes, we will improve on the definition of equation terms and the units being used, and handle the suggestions given in the annotated PDF.