Numerical Landscape Evolution Simulations Applied to Comet 67P

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Numerical landscape evolution modeling offers the possibility to tie Rosetta's many observations to the fundamental physics that drives erosional processes, and ultimately determine whether 67P evolves gradually, through its jets, or stochastically through large outburst events. Further, numerical simulations can yield insight into the feedback that exists between a mobile, insulating regolith layer and a volatile, erodible bedrock and how these competing processes impact the overall evolution of the landscape. Specifically, we utilize the MARSSIM landscape evolution model, which accounts for the thermophysical weathering of a bedrock composed of both volatile and non-volatile materials on a low, variable gravity environment like on 67P. These simulations allow us to constrain the rates of landscape evolution and the total erosional exhumation on 67P, to directly answer the question as to how its surface evolved despite the current apparent low levels of observed activity.