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| **DISSERTATION TITLE:** | *The influence of target properties on simple crater evolution — Application to the Moon* |

**Asteroider, måner og terrestriske planeter i vårt solsystem er dekket av nedslagskratere. Kraternes tetthet, størrelse og morfologi, samt hvordan disse faktorene endres fra område til område, kan gi kunnskap om den geologiske historien til disse ulike himmellegemene. I denne avhandlingen viser jeg at meteorittnedslag i materialer med ulike egenskaper har svært forskjellig tetthet, størrelse og morfologi. Dette viser hvor viktig det er å ta materialtype inn i beregningen når man bruker nedslagskratere til å tolke den geologiske historien til et himmellegeme.**

The record of impact craters can tell us about the structure and evolution of the surface of a planetary body. The morphology of craters is the best available constraints on the chronology of planets. Remote sensing techniques give the possibility to investigate planetary surfaces and their impact structures at high resolution. However, our knowledge about the detailed crater formation process remains fragmentary and surprisingly little is known about how the observed cratering record is linked to the properties and structure of the targets body.

This lack of insight motivates this thesis, and addresses how an impact crater evolves in response to the material properties of the target body. Focus is on the Moon as the Solar System's planetary object with the most comprehensive cratering record and on craters smaller than about 16 km, as they are the most affected by changes in material properties. The thesis explore three main questions; (1) The formation of the transient crater, i.e. the early stages of crater evolution; (2) The modification from the transient to the final, observed crater; And finally (3) how the presence of multiple layers with different properties in the target impacts crater evolution and relates to the variety of observed crater morphologies on the Moon. Each of these main questions is investigated with the help of numerical impact modelling.

One of my main findings is that the target's coefficient of friction is of first-order importance for the resulting geometry of the impact crater. Moreover, two-layered targets reveals a much more complex evolution of crater formation than previously thought and leads to a much wider variety of final crater morphology that mostly depends on the impact velocity and strength contrast of the different layers. These findings provide an interesting future perspective since observed crater morphologies on the Moon, but possibly also other planetary bodies, may thus be used in combination with numerical results and scaling laws to infer subsurface target structure.