# Determination of meteoroid entry parameters for terrestrial strewn fields

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## Introduction

Crater strewn fields resulting from fragmentation of cosmic bodies in the atmosphere are common on planets with atmosphere [1], [2], [3]. Several terrestrial crater fields were formed by iron projectiles. Existing physical models of meteoroid interaction with the atmosphere [1] enable to determine entry parameters of such crater-forming bodies.

### Methods

In this study we combine an atmospheric entry model with the simulation of impact crater formation. The aim is to determine entry parameters for several known terrestrial strewn fields. First, we use standard equations describing ablation and deceleration of impacting bodies in in the atmosphere [4]. To simulate the fragmentation process, we use the modified so-called Pancake approximation [4]. To determine the position of each big fragment we use a Monte Carlo method and the standard cumulative size-frequency distribution of fragments. These fragments move independently to the ground and some of them may be subjected to another fragmentation cycle. To estimate crater diameters, we use standard scaling laws [5]. To account for the effect of material properties on crater size we consider material-dependent parameters derived from simulations with the multi-material multirheology iSALE2D hydrocode [6].

### Results

To exclude non-suitable pre-entry parameters for terrestrial strewn fields, we use criteria based on: 1) the total number of craters, 2) the diameter of the biggest crater, 3) the maximum distance between two craters.



Figure 1: The observed Morasko strewn field (top) and an example of the modeled crater distribution (bottom). The meteoroid's trajectory is marked by the black arrow. Some meteorites tens of kilograms are shown by stars.

#### acknowledgements

The work was supported by National Science Center (Poland), grant no. 2013/09/B/ST10/01666.

#### References

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