Geophysical Research Abstracts
Vol. 18, EGU2016-1425, 2016
EGU General Assembly 2016

How do drumlin patterns evolve?

Jeremy Ely (1), Chris Clark (1), Matteo Spagnolo (2), and Anna Hughes (3)

(1) Department of Geography, University of Sheffield, Sheffield, United Kingdom, (2) School of Geosciences, University of Aberdeen, Aberdeen, UK, (3) Department of Earth Sciences and Bjerknes Centre for Climate Research, University of Bergen, Bergen, Norway

The flow of a geomorphic agent over a sediment bed creates patterns in the substrate composed of bedforms. Ice is no exception to this, organising soft sedimentary substrates into subglacial bedforms. As we are yet to fully observe their initiation and evolution beneath a contemporary ice mass, little is known about how patterns in subglacial bedforms develop. Here we study 36,222 drumlins, divided into 72 flowsets, left behind by the former British-Irish Ice sheet. These flowsets provide us with 'snapshots' of drumlin pattern development. The probability distribution functions of the size and shape metrics of drumlins within these flowsets were analysed to determine whether behaviour that is common of other patterned phenomena has occurred. Specifically, we ask whether drumlins i) are printed at a specific scale; ii) grow or shrink after they initiate; iii) stabilise at a specific size and shape; and iv) migrate. Our results indicate that drumlins initiate at a minimum size and spacing. After initiation, the log-normal distribution of drumlin size and shape metrics suggests that drumlins grow, or possibly shrink, as they develop. We find no evidence for stabilisation in drumlin length, supporting the idea of a subglacial bedform continuum. Drumlin migration is difficult to determine from the palaeo-record. However, there are some indications that a mixture of static and mobile drumlins occurs, which could potentially lead to collisions, cannibalisation and coarsening. Further images of modern drumlin fields evolving beneath ice are required to capture stages of drumlin pattern evolution.