How fuzzy is the data? Having student delineate drumlins and comparing the results.

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The increasing availability of high quality remotely sensed data has resulted in its inclusion in a variety of research disciplines, allowing for a greater spatial understanding of processes and landforms in different environments. Within glacial sedimentology and geomorphology, the use of remotely sensed data such as digital elevation models (DEM) has increased knowledge on the distribution of glacial landforms, e.g. drumlins, and the variety of morphologies that these landforms can encompass. Despite the potential of these data types there are many limitations that can impact the interpretations and conclusions associated with them.

The use of digital elevation models, hillshade imagery and aerial imagery in glacial geomorphology was introduced into a fourth year "Glacial sediments and Environments" earth science class. Students were provided a set of data covering a portion of a drumlin field found in southern Ontario, Canada which included a 10 m DEM, multiple hillshades with different azimuth and satellite imagery. After an introduction to drumlin morphology, identification and formation each student was asked to identify and manually digitize the drumlins within the study area using ArcGIS. The purpose of this assignment was: to introduce students to different types of remotely sensed data, the benefits and the limitations; to critically assess the geomorphology of a given region and provide interpretation; to provide insight into the variability of landforms and the tendency to differ from the idealized description; and to exemplify the impact of user interpretation in manually mapped geomorphological studies.

Five years of this assignment has produced over 100 examples of maps of the interpreted drumlin field. Each year, the maps are compiled to help students visualize the impact of user interpretation on landform delineation. This assignment provides a basis of understanding for the rest of the course as glacial environments and glacial geomorphological features are explored. For example, in a later assignment focusing on the varied theories of drumlin formation the students use their experience with landform mapping to inform how they reflect on and interpret the analysis in the research articles. In general, students have enjoyed the activity as it provides an opportunity to work with real world data, to understand a type of landform mapping and introduces concepts that they explore throughout the semester.