The COOL-DUNES project: Factors controlling spatial patterns of periglacial dune fields in the central part of the European Sand Belt

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The influence of periglacial conditions on the development of aeolian bedforms is not well understood. Observations of active dune fields in polar regions show that they can develop as either consistent dune fields, similar to what is known from hot regions, or as isolated sand patches controlled by the ground-water table. However, modern periglacial dune fields are rare, hampering the investigation of the factors that control dune-field evolution in cold regions.

The aim of this project is to define factors controlling the spatial pattern of periglacial dune fields in the central part of the European Sand Belt. Methods will include high-resolution morphometry and GIS analyses, combined with ground-penetrating radar, granulometry, and quartz-grain morphoscopy in an integrated approach. Pleistocene dune fields located in Poland will serve as key areas for similar dune systems elsewhere. Results will be supported by detailed studies of individual dunes. The project will try to answer the questions about 1) the impact of periglacial conditions (seasonal variability in sand supply, patches of permafrost, high surface wetness) and morphological framework (topography, surface inclination, occurrence of morphological barriers) on the development of dunes and dune fields; 2) spatial differentiation of aeolian processes within European Sand Belt.

The scientific hypothesis to test is that dune fields in periglacial regions are controlled by high variability of local depositional conditions, which result in the coexistence of various dune types and weak spatial organization of dune fields.

Results will allow us to develop a model of periglacial dune field evolution. Data will not only shed new light on periglacial aeolian morphology, but will be also valuable for the analyses of climatic conditions at the end of the last glacial.

The project is funded by Polish National Science Centre, contract number 2021/41/N/ST10/00350.