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Late Weichselian history of the Moravian Sahara cold-climate dune field, Lower Moravian Basin, Czechia

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Aeolian dune field pattern could provide a very detailed image of the influence of environmental controlling factors (wind regime, topography, sediment supply and others) to its development. Moravian Sahara dune field located in Southern Moravia, Czechia, and thus far away from the European Sand Belt (i.e. the area of major aeolian accumulations in Europe), represent a unique archive reflecting the effects of these variables. Even despite its remoteness from the Fennoscandian Ice Sheet during the Last Glacial Maximum, the permafrost occurred in Southern Moravia, and thus periglacial processes operated here. Different approaches including LiDAR DTM analysis, ground-penetration radar (GPR), and near-surface wind modelling were applied to investigate the role of the controlling factors. Two groups of differently oriented periglacial-related dunes (ENE-WSW and N-S) have been distinguished via the DTMs, suggesting a significant twist in atmospheric circulation connected with the retreat of the Fennoscandian Ice Sheet after the Last Glacial Maximum. Beside that, a strong influence of the local topography to the modification of the wind flow and the possible sediment sources were distinguished and described. Furthermore, confrontation of the reconstructed palaeowind directions with the modelled atmospheric circulation during the Weichselian and the OSL ages of aeolian sediments enabled the temporal assignment of the Moravian Sahara dune field development to the Late Pleniglacial and Late Glacial periods. Thus, our results show their applicability to the very detailed study of the influence of environmental conditions on the development of the cold-climate aeolian dune fields.