

Sudden COLD events of the Last Glacial in the central part of the European LOESS Belt - in Poland and in the western part of Ukraine (COLD LOESS)

Loess is a widespread sedimentary rock, consists of fine quartz silt particles and transported by the wind. In Europe it occurs in the form of a belt stretching from the southern part of Great Britain, through Belgium, the Netherlands, Germany, Poland, to Ukraine and Russia. Loess is well known for the development of fertile soils on it and is a good material for the production of bricks.

Loess in Europe was deposited in cold climate conditions, in the so-called periglacial zone - on the foreground of former continental glaciations. It is probably the reason that climate changes are indirectly recorded in loess covers. In warm periods, soils were developed on loess, and in cold periods the aeolian silt was deposited. In particularly cold periods, loess covers froze and permafrost started to develop. The proof of its presence are the structures of former ice wedges, which nowadays are formed at average annual temperatures lower than -4°C .

Several generations of ice-wedge structures occur in loess deposited during the last glaciation in Poland and in the Volhynia-Podolja Upland - the proposed research area. They are evidence of average annual temperatures lower by a dozen or so degrees than those currently observed. Even more astonishment and the need for explanation is justified by the assumption that at least some of these horizons were formed as a result of sudden, short-term cooling (about 1000 years) followed by equally sudden warming of the climate, when ice wedges and permafrost were thawed.

The rapid, short-term (millennial) cooling of the climate during the last glaciation has been discovered and documented on the basis of Greenland ice cores studies. So far, however, it has not been clarified whether and which of them are of regional and which are of global extend.

The objective of COLD LOESS project is to verify previous climate interpretations based on the analysis of periglacial phenomena in last glacial loess and to investigate whether and which sudden Greenland cold events are reflected in loess covers of Poland and Volhynia-Podolja Upland. We also intend to determine the spatial diversity of periglacial structures and phenomena in this area.

Our advantage is a good field recognition of periglacial structures in loess covers as well as the possibility of using new research methods and techniques of much greater precision in determining the age and conditions of formation of the examined objects.

The results of extensive, interdisciplinary field and laboratory tests (laser scanning, sedimentological and isotopic research, age determination by means of the latest OSL and IRSL techniques and parallel ^{14}C dating) will be the basis for achieving the objectives of our research and verification of research hypotheses. The participation in the COLD LOESS project of renowned experts dealing with loess and periglacial problems in Europe will be a guarantee of conducting objective and comparable research and will contribute to the wide dissemination of the results obtained.