



# Space-Time Modeling of Climate Change and Bioclimatic Potential of Steppe Soils

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**Abstract:** Climate change manifests itself in the intensity, frequency of climate anomalies and extreme weather phenomena at different levels of the hierarchy in space and time. Climate research is a complex interdisciplinary problem covering environmental, economic and social aspects of sustainable development of the world's countries. The study presents the results of space-time modeling and identifying regularities in climate change and also bioclimatic potential of the steppe soils in Ukraine applying specialized methods and GIS-technologies. The past 30 years are the most extreme period by the frequency of climate anomalies with a steady trend-cycle increase in the air temperature by 2°C and a reduction in the annual precipitation by 178 mm. It caused an increase in solar radiation reaching the earth surface by 7.2%, a decline in natural moisture by 66.4% and the hazard of soil washout by 80.5%, a reduction in climate energy expenses for soil formation by 21%, in bio-productivity of plants by 62% and in the potential of humus horizon capacity of steppe soils by 34.5%, that led to deterioration in the conditions of agricultural production, a decrease in crop productivity, self-regenerating and self-regulating functions of steppe soils. The obtained results are the basis for developing and introducing new measures for adaption to climate change at different economic levels.

**Keywords:** Climate, Air temperature, Precipitation, Bioclimatic potential, Soil formation, Humus horizon, Steppe soils, Modeling, GIS-technologies

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