EGU25-13293, updated on 08 Jan 2026
https://doi.org/10.5194/egusphere-egu25-13293
EGU General Assembly 2025

Spatial and Temporal Assessment of Soil Salinization Across Europe

Mohammad Aziz Zarif[1,2], Amirhossein Hassani[3], Mehdi H Afshar[1,2], Panos Panagos[4], Inma Lebron[5], David A Robinson[5], and Nima Shokri[1,2]

[1]Institute of Geo-Hydroinformatics, Hamburg University of Technology, Hamburg, Germany
[2]United Nations University Hub on Engineering to Face Climate Change at the Hamburg University of Technology, United Nations University Institute for Water, Environment and Health (UNU-INWEH), Hamburg, Germany
[3]The Climate and Environmental Research Institute NILU, P.O. Box 100, Kjeller 2027, Norway
[4]European Commission, Joint Research Centre (JRC), Ispra, IT-21027, Italy
[5]UK Centre for Ecology & Hydrology, Bangor, UK

Soil salinization, referring to the excessive accumulation of soluble salt in soils, adversely influences nutrient cycling, microbial activity, biodiversity, plant growth, and crop production, thus affecting soil health and ecosystem functioning (Shokri et al., 2024). Soil salinity quantification is a major step toward the mitigation of its effects. Therefore, developing quantitative tools to predict soil salinity at regional and continental levels under different boundary conditions and scenarios is crucial for sustainable soil management and the security of natural resources (Hassani et al., 2020, 2021). This study proposes an AI-driven soil salinity quantification and projection approach focused on EU soils using a set of environmental covariates, which consist of soil properties, terrain attributes, climate, and remotely sensed variables. A key aspect of this study is the integration of soil salinity point data from the LUCAS survey in the AI model, complemented by the WoSIS dataset. To improve the model performance, forward feature selection technique was applied. The model achieved the training, testing, and validation accuracy, expressed in , of 0.7, 0.7, and 0.57 respectively. The analysis indicates that 4.9 and 0.6 Mha of the EU land exceeds the 1 and 2 dS/m of electrical conductivity, respectively, highlighting the regions of concern. Italy, Spain, and France show high levels of soil salinity respectively. The output of the predictive model will be a gridded dataset illustrating the spatial and temporal (yearly) distribution of soil salinity across the EU, accompanied by the corresponding uncertainty map with a spatial resolution of 1 km. This information is crucial for identifying regions with elevated salinity levels and formulating necessary action plans to mitigate the situation.