Use of geographically weighted regression to map soil organic carbon contents in Ireland

Chaosheng Zhang[a],*, Ya Tang[b], XianLi Xu[c], Ger Kiely[c]
[a] *Department of Geography, National University of Ireland, Galway, Ireland*
[b] *Department of Environmental Sciences, Sichuan University, Chengdu, Sichuan 610065, China*
[c] *Department of Civil Engineering, University College Cork, Ireland*

Improvement in spatial interpolation of soil organic carbon (SOC) contents is important for production of high quality SOC distribution maps. This study attempted to use a geographically weighted regression (GWR) method for improved spatial interpolation of SOC in Ireland. A total of 1310 samples of SOC data were extracted from National Soil Database of Ireland. Out of which, 131 values (10% of the total number) were randomly selected and reserved for validation. Environmental factors of rainfall, land cover and soil type were investigated and included as the independent variables to establish the GWR model in a geographical information system (GIS) environment. The results from validation demonstrated that compared with other methods of kriging, inverse distance weighted (IDW) and ordinary least square (OLS) regression, the performance of GWR was the best. The SOC map produced using GWR showed clear influences of the environmental factors, and the smoothing effect was overcome. With the availability of improved maps of environmental factors in the digital format, this study has demonstrated that GWR provides a promising way for improved spatial interpolation of SOC.