Geophysical Research Abstracts
Vol. 19, EGU2017-8635, 2017
EGU General Assembly 2017

Artificial neural network model for estimating the soil respiration under different land uses

Mitra Ebrahimi (1), Mohammad Reza Sarikhani (2), Ali Akbar Safari Sinegani (1), Abbas Ahmadi (2), Saskia Keesstra (3,4)

(1) Department of Soil Science, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran, (2) Department of Soil Science, Faculty of Agriculture, University of Tabriz, Iran, (3) Wageningen University, Soil Physics and Land Management, Wageningen, Netherlands (saskia.keesstra@wur.nl), (4) Civil, Surveying and Environmental Engineering, The University of Newcastle, Callaghan 2308, Australia.

Soil respiration is a biological process in microbes that convert organic carbon to atmospheric CO_2. This process is considered to be one of the largest global carbon fluxes and is affected by different physicochemical and biological properties of soil, land usageuse, vegetation types and climate patterns. The aim of this study was to estimate the soil basal (BR) and substrate induced respiration (SIR) of 150 data obtained from soil samples collected from depth (0-25 cm) under different land uses by Artificial Neural Network. Soil samples were chosen from three provinces of Iran, with humid subtropical and semi-arid climate patterns. In each soil sample, soil texture, pH, electrical conductivity (EC), calcium carbonate equivalent (CCE), organic carbon (OC), OC fractionation data e.g. light fraction OC (LOC), heavy fraction OC (HOC), cold water extractable OC (COC) and warm water extractable OC (WOC), population of fungi, bacteria and actinomycete, BR and SIR were measured. Our goal was to use the most efficient ANN-model to predict soil respiration with simple soil data. Our results indicated that in an ANN model containing all the measured parameters, the R2 and RMSE values for BR prediction were 0.64 and 0.047 while these statistical indicators for SIR obtained 0.58 and 0.15, respectively. The R2 and RMSE values of the BR-ANN and SIR-ANN predicted models comprising 7 variables (including OC, pH, EC, CCE and soil texture) were estimated at 0.66, 0.043 and 0.52, 0.16, respectively. It was concluded that ANN modeling is a reliable method for predicting soil respiration.

KEYWORDS: Artificial neural network; Land use; Soil physicochemical properties; Soil respiration; Soil microorganism