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Pedotransfer function to predict soil bulk density in Mediterranean agro-ecosystems, a systematic map.

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To collate all the prior information about modelling the soil bulk density (BD) in Mediterranean climate agro-ecosystems at a world-scale, a systematic map was carried out. The strength of the systematic map approach is the collection of all the international peer review publications available in different archives that allows for the historical track of the topic developments.

To estimate BD, the most common approach is the use of Pedotransfer functions (PTFs). In this study, a search query was developed to find out all the already published PTFs for BD estimation and the search was carried out on the two most used citation database of peer-reviewed literature, namely SCOPUS and Web of Science (WoS).

The Bibliometrix package developed by Aria and Cuccurullo (2017) was used to map the main bibliometric information, extracted from Scopus and WoS. Following the systematic map procedure, we carried out a search on title, abstract and keywords using the following query: (bulk AND density AND pedotransfer) OR (bulk AND density AND Mediterranean)) that yielded 750 results in Scopus and 889 in WoS.

Alternatively, ((bulk density AND pedotransfer) OR (bulk density AND Mediterranean) AND NOT (forest OR amazon* OR petrol*)) AND (LIMIT-TO (DOCTYPE , article) OR LIMIT-TO (DOCTYPE, review)), which have yielded 717 and 567 records in WoS and Scopus respectively, of which the 30% were found in both database.

The researches were published between 1989 and 2020. The final database consists of 889 articles coming from 243 different journals. The average annual publication growth rate was 4%, but in 2019 it was the 10%. United States was the most productive country with more than 90 articles published, as it was confirmed by the number of publications found in Geoderma and the American Soil Science journal with 20 and 15 % respectively. We found that less than 5% of the records were relevant to our target objective.

This search provided a background in terms of variables used to build the PFT, methodologies used (e.g. multiple linear, nonlinear regression, machine learning), and detailed land use. Given the importance of SOC stock for carbon sequestration and soil fertility, a PTFs is a valid tool to estimate the BD and therefore the amount of SOC in Mediterranean agro-ecosystems.

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