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Georeferenced soil database for running country-level forest growth simulation using the 3-PG process-based model

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Abstract

In the current scenario of climate change, forest management faces new challenges, which has led to an increased interest in physiologically based forest growth models. One of the simplest and most versatile models, which has been used with different objectives namely to assessing the impact of climate change on forest stands, is the 3-PG (Physiological Principles in Predicting Growth). This physiologically based model has been widely used and tested to predict the primary productivity of forest stands around the world. In this model, soil fertility is assigned through a fertility index, the so-called FR (fertility rating), that varies between 0 and 1. Another fundamental variable for site characterization is the maximum value of water available in the soil (MaxASW). The objective of this work was to create a database for public use, which indicates the values of FR and MaxASW for different geographical situations in Portugal. For this purpose, photopoints from the National Forest Inventory were layered with soil information from SNISolo and EPIC WebGIS Portugal. The FR and MaxASW were estimated for each pedological unit based on the descriptions and analytical data of the different soil profiles contained in the soil cartography descriptive memories allowing to assign each photopoint one or more FR and/or MaxASW values, depending on the characteristics of the corresponding pedological unit. Preliminary tests based on the comparision of observed data with results of 3PG simulations showed the reliability of the information provided for FR and MaxASW. The database is still under testing and the work will keep ongoing in order to tackle the lack of properly validated cartography for the coastal center part of the country and revise the FR and MaxASW estimates whenever georeferenced pedological information becomes available.

Keywords: 3-PG, fertility rating, MaxASW, soil database, forest simulation