



Assessment of the soil water content temporal variations in an agricultural area of Galicia (NW Spain)

Roger Manuel Mestas-Valero, Jose Manuel Miras-Avalos, and Antonio Paz-González

Universidade da Coruña, Instituto Universitario de Xeoloxía, Facultad de Ciencias, A Coruña, Spain (jmirasa@udc.es, +34 981167065)

The direct and continuous assessment of the temporal variation on soil water content is of paramount importance for agricultural practices and, in particular, for the management of water resources. Soil water content is affected by many factors such as topography, particle size, clay and organic matter contents, and tillage systems. There are several techniques to measure or estimate soil water content. Among them, Frequency Domain Reflectometry (FDR) stands out. It is based on measuring the dielectrical constant of the soil environment. This technique allows to describe water dynamics in time and space, to determine the main patterns of soil moisture, the water uptake by roots, the evapotranspiration and the drainage. Therefore, the aim of this study was to assess the daily variation of soil water content in the root-influenced zone in plots devoted to maize and grassland as a function of the soil water volumetric content. The studied site is located in an experimental field of the Centre for Agricultural Research (CIAM) in Mabegondo located in the province of A Coruña, Spain (43°14'N, 8°15'W; 91 masl). The study was carried out from June 2008 to September 2009 in a field devoted to maize (*Zea mays*, L.) and another field devoted to grassland. The soil of these sites is silt-clay textured. Long-term mean annual temperature and rainfall figures are 13.3 °C and 1288 mm, respectively. During the study period, maize crop was subjected to conventional agricultural practices. A weekly evaluation of the phenological stage of the crop was performed. An EnviroSCAN FDR equipment, comprising six capacitance sensors, was installed in the studied sites following the manufacturer's recommendations, thus assuring a proper contact between the probe and the soil. Soil water content in the root-influenced zone (40 cm depth in grassland and 60 cm depth in maize were considered) was hourly monitored in 20 cm ranges (0-20 cm, 20-40 cm, and 40-60 cm) using FDR. Evaluations were performed on days with slight or no rainfall during the whole study period in the grassland field and during the cultural cycle in the maize field. Simultaneously, the water volumetric content of the soil was estimated. The daily humidity data in the root-influenced zone were related to daily average of the soil water volumetric content using simple correlation. For the whole study period, in the grassland field, the average of soil water volumetric content was 22.77%, ranging from 15.10% to 36.07%. In the case of the maize field, the average was 25.29%, varying from 19.09% to 33.26%. The averages of daily variation of the soil water content (for days with no rainfall) were 1.36 mm and 2.95 mm for grassland and maize fields, respectively. Correlation coefficients between daily volumetric content and soil water variation were 0.61 for grassland and 0.64 for maize, both of them significant and positive. This indicates that water volumetric content of the soil is an important factor in daily variations of soil water content influencing evapotranspiration, water uptake by roots and infiltration. Therefore, monitoring soil water content would be useful in the decision making concerning the irrigation management.