

## Tillage and surface moisture effects on bare-soil albedo of a tropical loamy sand

Philip G. Oguntunde<sup>✉</sup>, Ayodele E. Ajayi and Nick van de Giesen<sup>1</sup>

Center for Development Research (ZEF), University of Bonn, Walter Flex Str. 3, 53113 Bonn, Germany


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### Abstract

Effects of four tillage systems on the albedo of a tropical loamy sand were studied under dry and moist surface conditions. The aim was to determine whether tillage-induced roughness and soil wetness significantly affected soil albedo. Changes in smooth reference surface albedo with respect to four roughness conditions were used to assess tillage effects. Surface albedo ( $\alpha$ ), soil moisture content ( $\theta_m$ ) and soil surface roughness ( $\delta$ ) were measured. Two types of pyranometers used for albedometers are CM 3 and SP LITE. Mean albedo of a reference smooth surface (<2 mm sieved soil) was 0.16 and 0.20 for CM 3 and SP LITE under moist condition, and 0.29 and 0.28 under dry condition, respectively. Bare-soil shortwave albedo generally increased with an increase in solar zenith angle, whereas albedo decreased with an increase in surface roughness and soil wetness. Linear relationships of albedo with surface roughness and soil moisture content indicated that albedo was more sensitive to surface roughness under dry condition. The goodness-of-fit of a multiple linear regression model combining the effects of roughness and wetness on surface albedo was 0.96 with a standard error of 0.01. This simple model could be used to estimate albedo of bare soil similar to the tropical loamy sand reported in this study. This study provides useful information for modelling tillage effects on the energy budget at the soil surface.

**Keywords:** Tillage; Surface wetness; Bare-soil albedo; Tropical loamy sand; Regression model

 Corresponding author. Present address: Water Resources Section, Faculty of Civil Engineering and Geosciences, Delft University of Technology, The Netherlands. Tel.: +31 15 2784776; fax: +31 15 2785559.

<sup>1</sup> Present address: Water Resources Section, Faculty of Civil Engineering and Geosciences, Delft University of Technology, The Netherlands.