

Assessing the effect of slope and weather conditions on area measurement using GPS.

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Despite the great potential of GPS technology for land area measurement, GPS-based coordinates are subject to known types of measurement error rooted in satellite position, signal propagation, and receivers. Approximate contributions of these factors to the overall position error are significant, ranging from 0.5 to 4 meters (Hofmann-Wellenhof et al., 2007). Other factors may also contribute to the imprecision of land area measurement. Recent research by FAO, for instance, points out possible effects of weather conditions at the time of measurement on the accuracy of area measurement in general, and GPS-based area measurement in particular (Keita and Carfagna, 2009). Slope-related effects on area measurement are rooted in the fact that the actual area should be the horizontal projection of the parcel, as opposed to the parcel area itself (Muwanga-Zake, 1985). The difference between actual area and projection appear to be particularly important for slopes greater than 10 degrees (Fermont and Benson, 2011).

In this paper, the authors will present new empirical evidence on these relationships based on cross-country household survey data from Sub-Saharan Africa.

Key words: GPS, Crop Area Measurement, Slopes and Weather conditions