**Abstract**

Food security will be the biggest challenge for Tanzania in the next decades. Because of limited extendable arable land, the yield (per hectare) must increase to achieve a higher food production. Besides the yield level, the yield stability is also crucial for food security. In Tanzania, maize (*Zea mays* L.) is the most important food crop. Although the average yield is below 1.3t ha-1, yield variability is relatively high (standard deviation: ±0.8t ha-1). Nevertheless, Tanzanian field trials show that maize has a large potential to increase yields and thus, enhance food security. To increase crop yields, crop model assessments can contribute optimizing agronomic management and separating the yield impacts of agronomic management and weather conditions. The process-based model SWIM (Soil and Water Integrated Model) can compute the impacts of different agronomic practices. The statistical model IRMA (Interregional Regression Model for Agriculture) captures impacts of weather, agronomic management, and socio-economic influences on farm maize yields. The use of different crop model approaches improves the robustness of the model outputs. This enables yield assessments on different production levels. For entire Tanzania, we find a yield gap of 6.2t ha-1. The actual yields (1.3t ha-1) are only 17% of the yield potential (7.5t ha-1). However, increased yields are more sensitive on weather impacts, because nutrient supply is no longer yield limiting. Statistical models can contribute to gain insights of the impacts on crop yields in particular for the various farming conditions in Sub-Saharan Africa. These models can separate the weather-related yield risks. This information can be directly used to calculate micro-insurance claims and thus to stabilize small scale farmers’ income.