How satellite rainfall estimate errors may impact rainfed cereal yield simulation in West Africa.

Johanna Ramarohetra*[1], Benjamin Sultan[1], and Christian Baron

[1]Laboratoire d'Océanographie et du Climat : Expérimentations et Approches Numériques (LOCEAN) – Université Pierre et Marie Curie (UPMC) - Paris VI, CNRS : UMR7159, INSU, Institut de recherche pour le développement [IRD] : UMR7159, Muséum National d'Histoire Naturelle (MNHN) – case 100 4 place jussieu 75252 PARIS CEDEX 05, France

Abstract

Rainfall monitoring via satellite sensors is particularly relevant for the agricultural sector of West Africa. Indeed, food shortages in this region are often caused by rainfall deficits and an early access to data available for the entire region can help to provide credible and timely information for better decision making and to climate impact studies. This work assesses the accuracy of state-of-the-art satellite rainfall retrievals for agriculture applications in two sites in Niger and Benin. Although these satellite data are widely used instead of rain gauge data for such applications, we found that, in a crop-modeling framework, their use can introduce large biases in crop yield simulations. Biases differ strongly among the four cultivars considered in both sites and are not simple extrapolation of each satellite product cumulative rainfall amount biases. In particular, we found that if an accurate estimation of the annual cumulative rainfall amount is important for yield simulations of pearl millet 'Souna 3' and 'Somno' cultivars in Niger, a realistic distribution of rainfall is also very important for predicting pearl millet 'Somno' and 'HK' yields in Niger as well as maize yields in Benin. Over all the satellite products tested, 3B42v6 appears to be the most suitable satellite product for our specific agricultural application since it minimizes both biases in rainfall distribution and in annual cumulative rainfall amount. For each crop and in both regions, biases in crop yield prediction are the highest when using non calibrated satellite rainfall products (PERSIANN, 3B42RT, CMORPH and GSMAP).

*Speaker