High Resolution, Regional Climate Modeling of the West African climate variability and change for applications to impact studies.

Abstract

In the most recent third assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2001), it is recognised that Africa is one of the most vulnerable regions to climate change and variability in the world. Since the late sixties, a significant trend towards lower rain in West Africa has occured. The consequences has been negative on a national and regional scale. factors such as sea surface temperature anomalies, land-use change or anthropogenic climate change may be responsible.

Over the next century, this change in precipitation patterns are expected to continue and be accompanied by a warming trend, rise in sea level and increased frequency of extreme weather events as floods and droughts. Sectors such as food and water security, landscape degradation and desertification, coastal degradation and health will be highly affected. So climate change remains a significant challenge for Africa.

But in West Africa, we currently have considerable difficulties in analysing and simulating the climate system with GCMs (Global Climate Models). The reasons are : the existence of important gradients of Vegetation, Temperature and Precipitation, large number of mesoscale convective systems (squall lines, MCCs) which are responsible for most of the rain in West Africa, orographic zones (Guinea highlands, Jos Plateau) and lakes (Lake Chad); that the GCMs can't represent adequately.

So, the tools for studying the west african climate system must include Regional Climate model for regional assessment. And in this research work, we use the ICTP Regional Climate Model (RegCM3).

Then the main objectives of this studies are :

- Investigate the 20th century West African climate trends in order to understand the physical processes associated with climate change and variability on a regional scale.

- Provide a quantitative estimate of climate change in West Africa for the 21st century (build climate change scenarios).

This study, once done, is an important tool to assess scientific, technical and socio-economical informations relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation.

However, one of the most important thing is the use of these datasets as input in the agricultural model that Senegalese policies develop to understand the impacts of climate variability and change on the agricultural sector.