Geophysical Research Abstracts,
Vol. 11, EGU2009-4784, 2009
EGU General Assembly 2009

Regional Climate Change Hotspots over Africa

U. Anber
(usama_anber@yahoo.com)

Regional Climate Change Index (RCCI), is developed based on regional mean precipitation change, mean surface air temperature change, and change in precipitation and temperature interannual variability. The RCCI is a comparative index designed to identify the most responsive regions to climate change, or Hot- Spots. The RCCI is calculated for Seven land regions over North Africa and Arabian region from the latest set of climate change projections by 14 global climates for the A1B, A2 and B1 IPCC emission scenarios.

The concept of climate change can be approaches from the viewpoint of vulnerability or from that of climate response. In the former case a Hot-Spot can be defined as a region for which potential climate change impacts on the environment or different activity sectors can be particularly pronounced. In the other case, a Hot-Spot can be defined as a region whose climate is especially responsive to global change. In particular, the characterization of climate change response-based Hot-Spot can provide key information to identify and investigate climate change Hot-Spots based on results from multi-model ensemble of climate change simulations performed by modeling groups from around the world as contributions to the Assessment Report of Intergovernmental Panel on Climate Change (IPCC).

A Regional Climate Change Index (RCCI) is defined based on four variables: change in regional mean surface air temperature relative to the global average temperature change (or Regional Warming Amplification Factor, RWAF), change in mean regional precipitation (, of present day value), change in regional surface air temperature interannual variability (,of present day value), change in regional precipitation interannual variability (, of present day value). In the definition of the RCCI it is important to include quantities other than mean change because often mean changes are not the only important factors for specific impacts. We thus also include inter annual variability, which is critical for many activity sectors, such as agriculture and water management. The RCCI is calculated for the above mentioned set of global climate change simulations and is inter compared across regions to identify climate change, Hot- Spots, that is regions with the largest values of RCCI. It is important to stress that, as will be seen, the RCCI is a comparative index, that is a small RCCI value does not imply a small absolute change, but only a small climate response compared to other regions.

The models used are:
CCMA-3-T47
CNRM-CM3
CSIRO-MK3
GFDL-CM2-0
GISS-ER
INMCM3
IPSL-CM4
MIROC3-2M
MIUB-ECHO-G
MPI-ECHAM5
MRI-CGCM2
NCAR-CCSM3
NCAR-PCM1
UKMO-HADCM3

Note that the 3 IPCC emission scenarios, A1B, B1 and A2 almost encompass the entire IPCC scenario range, the A2 being close to the high end of the range, the B1 close to the low end and the A1B lying toward the middle of the range. The model data are obtained from the IPCC site and are interpolated onto a common 1 degree grid to facilitate intercomparison.
The RCCI is here defined as in Giorgi (2006), except that the entire yea is devided into two six months periods, D J F M A M and J J A S O N.

RCCI=[n(ΔP)[U+FF0B]n(ΔP)+n(RWAF)+n(ΔT)]D...M + [n(ΔP)[U+FF0B]n(ΔP)+n(RWAF)+n(ΔT)]J...N (1)