Geophysical Research Abstracts
Vol. 20, EGU2018-5507, 2018
EGU General Assembly 2018

1.5 and 2 degrees of global warming in the CORDEX-Africa ensemble

Grigory Nikulin (1), Chris Lennard (2), Alessandro Dosio (3), Erik Kjellström (1), Youmin Chen (4), Andreas Hänsler (5), Marco Kupiainen (1), René Laprise (6), Laura Mariotti (7), Cathrine Fox Maule (8), Erik van Meijgaard (9), Hans-Jürgen Panitz (10), John F. Scinocca (11), and Samuel Somot (12)

(1) Swedish Meteorological and Hydrological Institute, Rossby Centre, Norrköping, Sweden (grigory.nikulin@smhi.se) , (2) Department of Environmental and Geographical Science, University of Cape Town, Cape Town, South Africa, (3) European Commission Joint Research Centre, Ispra, Italy, (4) Uni Research and the Bjerknes Centre for Climate Research, Bergen, Norway (present: Atmospheric, Oceanic and Planetary Physics Clarendon Laboratory, University of Oxford, Oxford, UK), (5) Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht, Hamburg, Germany, (6) Département des sciences de la Terre et de l'atmosphère, Centre ESCER (Étude et Simulation du Climat à l'Échelle Régionale), Université du Québec à Montréal (UQAM), Montreal, Canada, (7) Earth System Physics Section The Abdus Salam International Centre for Theoretical Physics (ICTP) Trieste, Italy (present: Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)), (8) Danish Climate Centre, Danish Meteorological Institute (DMI), Copenhagen, Denmark (present: Research Services, Statistics Denmark, Copenhagen, Denmark), (9) Royal Netherlands Meteorological Institute (KNMI), De Bilt, The Netherlands, (10) Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research - Tropospheric Research (IMK-TRO), Karlsruhe, Germany, (11) Canadian Centre for Climate Modelling and Analysis, Environment and Climate Change Canada, Victoria, Canada, (12) Centre National de Recherches Météorologiques (CNRM) UMR 3589, Météo-France/CNRS, Toulouse, France

In this study, for the first time we use the largest available CORDEX Africa ensemble to provide pan-African overview on how temperature and precipitation on annual scale may change at the 1.5° and 2ºC Global Warming Levels (GWLs). The ensemble consists of 25 simulations generated by different combinations of 10 RCMs and 10 driving GCMs. The subset of the CMIP5 GCMs used for downscaling in the CORDEX Africa activities well represents the median timing of both 1.5° and 2ºC GWLs, if compared to the full CMIP5 ensemble, although it slightly underestimates the spread. The CORDEX ensemble in turn well represents the spread of the warming in Africa compared to the driving GCMs but slightly underestimates its median, due to a few downscalings of the driving GCMs from the middle of the warming range. A pronounced warming emerges in Africa at the 1.5ºC GWL and amplifies at the 2ºC GWL exceeding the global warming rates over most of the African continent. The strongest warming is found in the subtropics, whereas the weakest one in many coastal regions due to the effect of slower warming ocean. There is a tendency towards an increase in annual mean precipitation in parts of Africa (e.g. central/eastern Sahel and eastern Africa) at both GWLs but uncertainties are large as the individual simulations do not agree on a sign of the change. In contrast to mean precipitation there is a robust increase in daily precipitation intensity of wet days (SDII) over large fraction of tropical Africa emerging already at 1.5°C GWL and strengthening at 2°C. A robust difference in effects of global warming between the 2 and 1.5ºC levels on regional climate in Africa is also found for annual mean temperature and SDII.