



Climate impacts on agricultural biomass production in the CORDEX.be project context

Anne Gobin (1), Bert Van Schaeybroeck (2), Piet Termonia (2), Patrick Willems (3), Nicole Van Lipzig (4), Philippe Marbaix (5), Jean-Pascal van Ypersele (5), Xavier Fettweis (6), Koen De Ridder (1), Trissevgeni Stavrakou (7), Patrick Luyten (8), and Eric Pottiaux (9)

(1) Flemish Institute for Environmental Research, Mol, Belgium, (2) Royal Meteorological Institute Belgium (RMIB), Brussels, Belgium, (3) KU Leuven, Department Civil Engineering - Hydraulics division, Leuven, Belgium, (4) KU Leuven, Department of Earth and Environmental Sciences, Leuven, Belgium, (5) Université Catholique de Louvain, Earth and Life Institute Georges Lemaître Centre for Earth and Climate Research, Louvain-la-Neuve, Belgium, (6) Université de Liège, Département de Géographie, Laboratoire Climatologie, Belgium, (7) Belgian Institute for Space Aeronomy, Department of Atmospheric Composition, Brussels, Belgium, (8) Royal Belgian Institute of Natural Sciences, Operational Directorate Natural Environment, Brussels, Belgium., (9) Royal Observatory of Belgium, Operational Direction "Reference Systems and Planetology", Brussels, Belgium

The most important coordinated international effort to translate the IPCC-AR5 outcomes to regional climate modelling is the so-called "COordinated Regional climate Downscaling EXperiment" (CORDEX, <http://wcrp-cordex.ipsl.jussieu.fr/>). CORDEX.be is a national initiative that aims at combining the Belgian climate and impact modelling research into a single network. The climate network structure is naturally imposed by the top-down data flow, from the four participating upper-air Regional Climate Modelling groups towards seven Local Impact Models (LIMs). In addition to the production of regional climate projections following the CORDEX guidelines, very high-resolution results are provided at convection-permitting resolutions of about 4 km across Belgium. These results are coupled to seven local-impact models with severity indices as output. A multi-model approach is taken that allows uncertainty estimation, a crucial aspect of climate projections for policy-making purposes.

The down-scaled scenarios at 4 km resolution allow for impact assessment in different Belgian agro-ecological zones. Climate impacts on arable agriculture are quantified using REGCROP which is a regional dynamic agri-meteorological model geared towards modelling climate impact on biomass production of arable crops (Gobin, 2010, 2012). Results from previous work show that heat stress and water shortages lead to reduced crop growth, whereas increased CO₂-concentrations and a prolonged growing season have a positive effect on crop yields. The interaction between these effects depend on the crop type and the field conditions. Root crops such as potato will experience increased drought stress particularly when the probability rises that sensitive crop stages coincide with dry spells. This may be aggravated when wet springs cause water logging in the field and delay planting dates. Despite lower summer precipitation projections for future climate in Belgium, winter cereal yield reductions due to drought stress will be smaller due to earlier maturity. Preliminary results will be presented using the new scenario runs for Belgium.