

Is “the perfect model” really needed? - Analysis of the quality level of climate information necessary for supporting adaptation in agriculture and forestry

Borbála Gálos (1), Wolf-Uwe Ostler (2), Péter Csáki (3), András Bidló (1), and Oleg Panferov (2)

(1) Institute of Environmental and Earth Sciences, Faculty of Forestry, University of West Hungary, Sopron, Hungary (galos.borbala@emk.nyme.hu), (2) Department of Life Sciences and Engineering, University of Applied Sciences, Bingen, Germany, (3) Institute of Geomatics and Civil Engineering, Faculty of Forestry, University of West Hungary, Sopron, Hungary

Recent results of climate science (e.g. IPCC AR5, 2013) and statements of climate policy (e.g. Paris Agreement) confirm that climate change is an ongoing issue. The consequences will be noticeable for a long time even if the 2 Degree goal is reached. Therefore, action plans are necessary for adaptation and mitigation on national and international level. Forestry and agriculture are especially threatened by the probable increase of the frequency and/or intensity of climate extremes. Severe impacts of recurrent droughts/heat waves that were observed in the last decades in the sensitive and vulnerable ecosystems and regions are very likely to occur with increasing probability throughout the 21st century. For the adequate climate impact assessments, for adaptation strategies as well as for supporting decisions in the above mentioned sectors the reliable information on the long-term climate tendencies and on ecosystem responses are required. Here are the two major problems: on the one hand the information on current climate and future climate developments are highly uncertain. On the other hand, due to limited knowledge on ecosystem responses, it is difficult to define how certain or accurate the provided climate data should be for the plausible application in agricultural/forestry research and practice.

Considering agriculture and forestry, our research is focusing on the following questions:

- What is the climate information demand of practice and impact research in the two sectors?
- What quality level of climate information is necessary for adaptation support?
- How does the accuracy of climate input affect the results of the climate impact assessments?

The agriculture and forestry operate at two very different time scales and have a different reaction times and adaptation capacities.

Agriculture requires short-term information on current conditions and short-/medium-term weather forecast. To assess the degree of information accuracy required by practical agriculture a questionnaire has been carried out among 180 farms of different sizes and specializations (mostly arable farming and viticulture) in Reinland-Palatine, Germany. The results show that almost all farmers use the weather information daily and are in need of weather forecast. More than a half requires also the forecast on extreme events. However the farmers require more qualitative (e.g. temperature coarser than 1°C) than high-precision quantitative information in short and medium-term forecasts.

Forestry requires long-term (30-100 years) climate projections. For the assessment of climate change impacts on forest distribution, production and tree species selection, monthly temperature means and precipitation sums are sufficient. Based on the results of regional climate models it will be shown how the bias, the spread and spatial resolution of the simulation results are affecting the accuracy of impact assessments.

Our analyses can help to fill the gap between climate services and the needs of impact researchers and end users in agriculture and forestry. User-relevant climate information can contribute to appropriate adaptation support services and management options in the two sectors.

Keywords: regional climate projections, climate impact assessment, agriculture, forestry, adaptation support, accuracy of climate information

Funding: The research is supported by the “Agroclimate-2” (VKSZ_12-1-2013-0034) joint EU-national research project.