

**Topic:** Agriculture, Climate Change and Food Security

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## **Agriculture, climate change and food security – progress and challenges in systems research and integrated assessment and modelling**

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Agriculture, climate change and food security are topics of high societal relevance and have been addressed within the Knowledge Hub MACSUR between 2012 and 2017. Substantial progress has been made in the modelling and assessment for parts of the agri-food system affecting and being affected by climate change with MACSUR. The paper aims to review this progress within the context of international research activities in this field of research and points to key challenges that require attention for future work.

MACSUR has developed from its initial focus in the first project phase on thematic research for the improvement of crop, livestock and agricultural economic modelling towards more integrated assessment and modelling approaches including stakeholder interactions in the second phase. Selected highlights of this research are presented. Particular emphasis is given to activities that successfully filled research gaps and advanced understanding of the agri-food system in interaction with climate change. Links to important international research projects such as AgMIP (Agricultural Model Intercomparison and Improvement Project) and cross-benefits of such interactions are pointed out. Reference is also made to the impact and valorisation of MACSUR research as evident from the diverse forms of outputs and impacts in the scientific literature, on other research projects, on policy-making and beyond.

Achievements of MACSUR are contrasted with recent developments in other sectors and the society affecting agriculture such as international political agreements (for example the United Nations Sustainable Development Goals and the Climate Conference COP 21 in Paris in 2015), new technologies (for example remote sensing, ICT and robotics), changes in the food retailing sector and the development of the bioeconomy. Emerging challenges for agriculture are highlighted and new research topics are identified. The important role of and demands for integrated assessment and modelling to support this development are determined and conclusions for future activities of MACSUR are drawn.