MOSAICC: An inter-disciplinary system of models to evaluate the impact of climate change on agriculture

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Climate change poses a great challenge to agricultural productions systems, potentially threatening those who particularly depend on local food production for their livelihood. Information on the impacts of climate change forms a primary tool for policy makers to cope with climate change. Studying the impact of future climate change on the hydrological cycle is of primary importance, as it strongly affects crop production. This affects directly the local economy, but might even affect the macroeconomic situation of a whole country. However, accurate trans-disciplinary assessment on the effects of climate change are difficult to achieve, as information is often scattered, incomplete or specifically focused on one scientific domain. An innovative multidisciplinary approach combining knowledge from the different domains would therefore be an ideal way to evaluate the impact of climate change on the hydrological cycle, coupled with its impact on agricultural production systems and socio-economic variables.

The Food and Agriculture Organization of the United Nations (FAO), in partnership with European research institutes, has developed an integrated package of models for assessing the impact of climate change on agriculture at a national level. The MOdelling System for Agricultural Impacts of Climate Change (MOSAICC) is based on a generic methodology defined to assess the impact of climate change on agriculture, using climate data downscaling, crop yield projections, water resource estimations and economic models. All models are connected through a common spatial database and interconnected in terms of input and output. All models and databases are platform independent and can be hosted on a central server. Multiple users can access the MOSAICC toolbox simultaneously through a web interface, making data exchange easy, transparent and efficient.

MOSAICC is unique and innovative as it combines a web-based interactive and integrated model environment together with tools and materials for capacity building and technology transfer to institutions and scientists. The specific design allows for inter-disciplinary working groups to stimulate cooperation and foster knowledge exchange. Currently, the MOSAICC toolbox is under validation in Morocco and will be implemented afterwards in other countries.

This paper describes the MOSAICC modeling system with a focus on the hydrological model STREAM. Examples are given on its utilization and performance under a range of different climate scenarios.

Keywords: climate change, agriculture, integrated environmental modeling, precipitation-runoff model, policy