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Co-building a simulation model with various stakeholders to assess the sustainability of a regional agricultural system: How to articulate different types of knowledge to manage uncertainty?

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Abstract: To assess the sustainability of agricultural systems at a regional scale with regards to possible changes in land use and cropping systems, designing simulation models to explore scenarios with stakeholders is a relevant approach. It implies coping with uncertainties from different areas, originating at both levels of imperfect data sets and misunderstood dynamics (due to incompleteness of knowledge and unexpected systemic effects). Additionally, dealing with various types of knowledge to co-design the model generates ambiguity from the simultaneous presence of multiple frames of reference about the system to be represented. On top of that, specifying scenarios to be explored with the simulation tool requires drawing knowledge-based, coherent pictures of the inherently uncertain future. All these dimensions of uncertainty merged in the context of a comodelling process that took place on a small French territory "Plateau de Valensole" in 2014-2016. About 30 participants (farmers, stakeholders, researchers) were involved during the process. For the design of a stylized spatial representation of the agro-ecological system, the construction of a farm typology, the specification of plausible scenarios of evolution and the choice of indicators for the assessment, different types of knowledge have been mobilized in different ways (collective workshops, individual interviews) and for different purposes (knowledge extracting or co-design). Other sources of information (regional databases and maps) were also used when knowledge was lacking or too uncertain. This methodological combination was found to be relevant to address the issue of tackling uncertainty in the modelling process. In this presentation, the simulation tool will also be presented, together with an example of the results obtained by simulating one scenario.

Keywords: Agricultural system; collaborative modelling; knowledge coproduction; uncertainty; agent-based simulation.