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JIRAIS: AGENT-BASED MODELING FOR SIMULATING IRRIGATION WATER USE IN PADDY LAND

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jIrAIs ("Java", "Irrigation", "Artificial Intelligences") is a new software tool for simulating irrigation water use in paddy land. In this paper presents the development and validation of the jIrAIs. The model simulates water circulation in soil-water-plant-atmosphere system and tasks in irrigation water management. The object-oriented approach (Java language) and Repast toolkit were selected as tools for model development. The model environment, consisting of 5 modules: (1) overland flow module was calculated by the diffusion wave equation, (2) soilwater flow module was described by Richards's equation, (3) crop modeling module, (4) control algorithms for the regulation of irrigation canals was developed by fuzzy rules and (5) decision system for rice cultivation by agent-based modeling technique. Validations of the output from jIrAIs were compared with those from other well-known models and also consider the reasonable results. jIrAIs was successful in simulating circulation water in soilwater plant-atmosphere system and simulate process of farmer decision-making. However, research is still indispensable for better representation of real system.

Keywords: Paddy field, jIrAIs, Agent-based modeling, Artificial intelligences

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