A brief review of the Coupled Human-Earth System modeling: current state and challenges

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Human activities have profound impacts on climate change and ecosystems via fossil fuel use and land-use, in turn the environmental changes affect human society. Due to the strong bidirectional links and feedbacks between the human societies and environment, there is an urgent need to identify complex dynamics of coupled human-earth systems (CHES) for mitigation and adaptation purposes. In this review, we addressed four critical feedback links between human and natural systems. Then, we made a brief description of the development history of the CHES modeling, and reviewed its current state. Finally, we conclude that the development of coupled human-earth system models is still in the primary stage, facing with several gaps and challenges in theory and technique associated with the process of models coupling. We argue that successful coupling of the CHES models requires two-way communication, consistent coupling process, and truly interdisciplinary collaboration of social and natural scientific teams.