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Coupling Human - Earth Systems for Sustainability

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Abstract: Human influence on the natural environment has intensified, and the earth has entered the stage of Anthropocene. Earth surface processes are gradually dominated by human behavior, resulting in numerous resources, disasters and ecological problems. The ecosystem services of 60% are degradation in the world. The one of major challenges facing the world's people are meeting the needs of people today and in the future, and sustaining atmosphere, water, soil and biological products which provided by ecosystems. We will present how to coupling human-earth system and propose the research priorities. They are: (1) Integrating research on multiple processes of water, soil, air and ecosystem; (2) Cascades of ecosystem structure, functions and services; (3) Feedback mechanisms of natural and social systems; (4) Data, models and simulation of sustainable development;(5) Mechanism, approach and policy of sustainable development. Finally, a case study in the Loess plateau of China, an area suffered from severe soil erosion in the world was taken. The changes in four key ecosystem services including water regulation, soil conservation, carbon sequestration, and grain production were assessed and the trade off among the ecosystem services were analysed under the changing landscapes due to the Chinese government's implementation of the Grain to Green Program (GTGP). We found that ecosystem services convert significantly. The adaptive management strategy was discussed aiming on restoring and improving the sustainable capability of ecosystems providing services, based on the understanding of structure, function and dynamics of ecosystem.