Response Characteristics of Biosphere in Earth System

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Response functions of biosphere are normally nonlinear. Feedback loops form a complex web and only a small input change leads to a large change in output. A compartment grows rapidly by a small trigger. All these factors make analysis and prediction of biosphere responses in the earth system difficult. However, these characteristics may occur in dynamic systems also, and increasing comprehension in nonlinear dynamics, we can predict behaviors of such systems.

We have the other reasons, by which we will never predict behavior of systems with biosphere. Response functions of biosphere themselves change according to change in environment. Physiological features change (acclimatization), and genetic types or symbiotic pattern change (adaptation) with change in environment. At last, species itself changes (evolution). We can only describe how species changed in the past, but prediction would mostly be impossible. Nonlinearity nature, complex feedback loop, acclimatization, adaptation and evolution have functioned to relieve stress from the environment, to stabilize output in response to changing input values. However, as the value exceeds the threshold, the cascading effect would emerge.