

INDICATING THE PROXIMITY TO A CRITICAL THRESHOLD: THE EXAMPLE OF A BIFURCATION IN A STOCHASTIC OCEAN MODEL

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It is well known, that there are critical thresholds in the climate system. What is not well known is the exact location of those thresholds. As exceeding those thresholds may well have drastic consequences for humankind, it would be quite useful to have indicators available that can detect the approach to such a threshold.

Within a deterministic context it is very difficult to determine how close one is to a bifurcation unless one knows the system's properties exactly. Within a stochastic context this may be different.

We consider a modified Stommel model of the Thermohaline Circulation. The model is modified by adding a stochastic freshwater forcing. As one gets closer to the saddle-node bifurcation where the circulation breaks down, the stochastic Stommel model shows distinct changes in the power spectral density. It is investigated whether these changes can be used to predict the distance to the bifurcation. Both numerical and analytical solutions are discussed as well as other types of bifurcations.