The Thermohaline Circulation - stochastic analysis of a dynamic system

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The Thermohaline Circulation (THC) plays an important role in the global climate system. It is driven by density gradients of heat and salt and transports huge amounts of them around the globe. We have formulated a model with seven boxes (four in the ocean and three in the atmosphere) to represent the whole Atlantic. This non-linear model includes tuning parameters in the sensible and latent heat transport, the net surface flux and the overturning flow. One goal is to investigate the sensitivity of the circulation with respect to these parameters. Steady states and stochastic differential equations are investigated by numerical solution and the eigenvalue analysis. First results suggest that the stability of the systems is not addicted to all tuning-parameters. The one which is linked to the sensible heat transport seems to be less important than the one for the net surface fluxes. The stability is evaluated by means of hystereses curves of the system. Finally, the effect of noise will be investigated in our low-order model of the ocean circulation.