



Noise induced multidecadal variability in the North Atlantic

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In a hierarchy of ocean models it has been found that multidecadal sea surface temperature variability in the North Atlantic arises from the presence of an internal ocean mode which destabilises the background state through a Hopf bifurcation. Here we present results of a study of the excitation processes associated with this multidecadal mode in the parameter regime where the mode is slightly damped. Using an idealized three-dimensional ocean model it is shown that the addition of noise to the surface heat flux can excite the multidecadal mode through the occurrence of a stochastic Hopf bifurcation. The mode is only weakly excited by white noise but the amplitude of the multidecadal variability can be greatly enhanced by including spatial and temporal coherence in the noisy forcing, particularly those with characteristics of the North Atlantic Oscillation. The focus of the presentation will be on the physics of the mode excitation, which involves rectification processes of the Atlantic meridional overturning circulation.