Polar amplification: results from idealized models, reanalysis products and observations

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An aquaplanet atmospheric GCM coupled to a mixed layer ocean is analyzed in terms of its polar amplified response to a 2xCO2-like forcing and in terms of phase space trajectory of the relaxation of a free perturbation to equilibrium. In earlier studies concerned with linear stability and fluctuation-dissipation analysis of the same system we have shown that the least stable mode of the linearized operaor of the system has a polar amplified shape. We demonstrate that this shape of the least stable mode is responsible for the polar amplified shape of the response to a uniform forcing and for the manner in which the system relaxes back to equilibrium. We use reanalysis products (ERA-40, NCEP) in order to quantify the signal in the Arctic atmosphere due to the influence of lateral heat transport from the lower latitudes. Robustness of polar amplification obtained from the reanalysis products is tested against radiosonde data from dataset IGRA.