1116-60-2350 **John S. Wettlaufer*** (`john.wettlaufer@yale.edu`), Yale University, 210 Whitney Avenue, New Haven, CT 06520-8109. *Stochastic Perturbation Theory, Stochastic Dynamics and the Climatic Transitions of Arctic sea ice.*

We analyze the numerical and analytical solutions of a stochastic Arctic sea ice model over a wide range of external heat-fluxes, ΔF_0, which correspond to greenhouse gas forcing. The state variable describing the deterministic backbone of our model is the energy, $E(t)$, contained in the ice or the ocean and we choose the simplest form of multiplicative noise $\sigma E(t)\xi(t)$, where σ is the noise amplitude and $\xi(t)$ is the noise process. The case of constant additive noise we write as $\sigma \overline{E_S}\xi(t)$, in which $\overline{E_S}$ is the seasonally averaged value of the periodic deterministic steady-state solution $E_S(t)$, or the deterministic seasonal cycle. We then treat the case of seasonally-varying additive noise, $\sigma E_S(t)\xi(t)$, as well as two types of multiplicative noise that depend on the form of stochastic calculus (Itô or Stratonovich) used. The comparison of these four cases reveals the stochastic anatomy of the system over the entire range of the ΔF_0 from the perennial ice states to near the ice-free state. The analytical solutions derive from a perturbation theory developed for non autonomous systems and thereby allow a clear test of the numerical approach over a wide range of ΔF_0. (Received September 22, 2015)