

The origin of solar cycle fluctuations

P. Charbonneau, (U. Montreal)

Dept. de Physique, Universite de Montreal, paulchar@astro.umontreal.ca

A proper understanding of the physical origin of fluctuations in the amplitude and duration of the solar magnetic activity cycle is essential for our understanding of solar influences on Earth's climate and space environment, as well as for long-range forecasting of overall magnetic activity levels on timescales commensurate with the planning of future space missions. In this talk I will argue that solar cycle fluctuations can be traced at least in part to deterministic effects associated with long time delays in the dynamo process. I will present recent modelling results supporting this conjecture, and show that Maunder-minimum-like episodes of strongly suppressed activity can arise naturally from perturbation of this time-delay dynamics by low-amplitude "magnetic noise", as produced for example by small-scale turbulent dynamo action due to convection.