

## **Mechanisms of Solar Cycle Fluctuations**

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In this talk I will review the various physical mechanisms having been invoked to explain the patterns of solar fluctuations in amplitude and duration, as inferred from long temporal records. Working from the dynamo point of view and using a variety of solar cycle models as starting points, I will illustrate the effects of (1) nonlinear magnetic backreaction on large-scale flows, (2) stochastic forcing due to variability of emerging active region characteristics, and (3) stochastic variability and nonlinear quenching of the turbulent electromotive force.

Based on these representative examples, I will survey and comment critically on the various extant dynamo-based solar cycle prediction schemes, distinguishing ``next-cycle'' prediction from prediction of longer timescale variability, from multi-decadal to millennial timescales, presumably more relevant to climate.