

Abstract Submitted
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Subcritical Magnetic Dynamos of Middle-aged Sun-like Stars Reconcile Solar-Stellar Activity Observation¹ BINDESH TRIPATHI, University of Wisconsin-Madison, USA; Center of Excellence in Space Sciences India, India; St. Xavier's College, Nepal, DIBYENDU NANDY, Center of Excellence in Space Sciences India, India; Indian Institute of Science Education and Research Kolkata, India, SOUMITRO BANERJEE, Indian Institute of Science Education and Research Kolkata, India — Long-term solar magnetic activity reconstructions indicate the solar dynamo operates in two distinct – grand minimum and regular activity – modes. By employing bifurcation analysis of a physically-motivated time delay dynamo model, we establish this to be a direct consequence of dynamo hysteresis. We reproduce the observed bimodal distribution of sunspots, but only for subcritical dynamos. We also demonstrate how the Sun can enter into the grand minima episodes and recover from it. A theoretical framework consistent with these findings explain confounding observations of an abrupt midlife transition in stellar activity, characterized by reduced angular momentum loss rates and breakdown of gyrochronology relations. Our study indicates that an evolving dynamo bridges a diversity of phenomena in Sun-like stars across their lifetime. (Ref: <https://arxiv.org/abs/1812.05533>)

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