

Estimating the Next Solar Cycle

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Our understanding of the solar cycle has progressed to the point where sunspot data assimilated into dynamo models can reproduce the strengths of the last eight cycles and are providing estimates for the strength of the next solar cycle. Prior to these recent developments in dynamo theory, solar cycle predictions were made on the basis of statistical correlations between cycle strength and prior measurements of quantities such as geomagnetic activity or the Sun's polar magnetic field strength. The newer dynamo models do make some connections between cycle strength and these previously used indicators. However, we are currently faced with a dilemma: one dynamo prediction (Dikpati, deToma, & Gilman, 2006) and one statistical precursor (geomagnetic activity - Hathaway & Wilson, 2006) suggest a very strong cycle while another dynamo prediction (Jiang, Chatterjee, & Choudhuri 2007) and another statistical precursor (polar field strength – Svalgaard, Cliver, & Kamide, 2005) suggest a very weak cycle. In this presentation I will explore the foundations of these predictions. This scientific dilemma should lead to new insights when the Sun reveals what it has in store for cycle 24.