The Quasi-Annual Forcing of the Sun's Eruptive, Radiative and Particulate Output

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The eruptive, radiative, and particulate output of the Sun are modulated by our star's enigmatic 11-year sunspot cycle. Over the past year we have identified observational signatures which illustrate the ebb and flow of the 11-year cycle – arising from the temporal overlap of migrating activity bands which belong to the 22-year magnetic activity cycle. As a consequence of this work we have deduced that the latitudinal interaction of the oppositely signed magnetic activity bands in each hemisphere (and across the equator near solar minimum) dramatically impacts the production of Space Weather events such as flares and Coronal Mass Ejections (CMEs). The same set of observations also permits us to identify a quasi-annual variability in the rotating convecting system which results in a significant local modulation of solar surface magnetism. That modulation, in turn, forces prolonged periods of significantly increased flare and CME production, as well as significant changes in the Sun's ultraviolet (UV), extreme ultraviolet (EUV), and X-Ray irradiance. We propose that that there are global-scale waves propagating along the bottom of the convection zone in the shear layer known as the tachocline and we are observing their impact on the surface magnetism, driven by buoyancy modifications of flux tubes in the deep convection zone.