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Global Magnetic Reversal in a Rapidly Rotating Sun NICHOLAS J. NELSON, University of Colorado at Boulder, BENJAMIN P. BROWN, University of Wisconsin-Madison, JURI TOOMRE, University of Colorado at Boulder — Global MHD simulations of the solar convection zone and a tachocline of shear at its base have demonstrated that strong bands of toroidal magnetic field can be built in the tachocline through stretching and organizing of small-scale fields pumped downward from the convection zone. Recent 3D simulations of more rapidly rotating suns have revealed that global-scale wreathes of toroidal magnetic field can be achieved in the bulk of the convection zone itself, remarkably even without a tachocline present. Continuing this work, we have carried out new simulations at higher turbulence levels in a sun-like star rotating at three times the solar rate. We obtain toroidal magnetic wreathes which have large temporal variations in field strength as they interact with turbulent convection and global differential rotation, yet they continuously rebuild themselves, persisting in the bulk of the convection zone for thousands of days. These magnetic structures can even undergo a reversal of global magnetic polarity. We describe here the properties of these structures and the nature of such a reversal.

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