

**Space Science Seminar**  
**THURSDAY, 2018 November 29**  
**10:30 a.m.**  
**NSSTC/2096**

**The Rails Inside the Sun and the Butterflies  
that Ride Them**

Dr. Andrés Muñoz-Jaramillo / SouthWest Research Institute

Host: Dr. Alphonse Sterling  
(Sponsored by ST13)

One of the biggest obstacles we face for understanding the solar cycle (and the dynamo that drives it) is our lack of information regarding the structure and evolution of the internal magnetic field. One of the most important puzzles that remains unsolved is the nature of large-scale magnetic-flux transport; namely the relative importance of advective transport (meridional flows) vs. turbulent transport (diffusion and pumping). In this presentation we will review recent studies that use the characteristics of the solar cycle butterfly wings to address this question. In particular we will discuss the fact that all hemispheric cycles follow the same latitudinal path, and decay the same way. Cast in the light of our current understanding, these results suggest that the toroidal fields inside the Sun are subject to a very high turbulent diffusivity (of the order of magnitude of mixing-length estimates), and their equatorward propagation is driven by a steady meridional flow. Assuming this is the case, we will revisit the relationship between the polar fields at minimum and the amplitude of the next cycle and show evidence that the observed level of activity of any given cycle is largely affected by cross-equatorial cancellation.

<https://solarscience.msfc.nasa.gov/colloquia/>