Abstract Submitted
for the MAS17 Meeting of
The American Physical Society

Global Solar MHD Modeling[1] ANDREY STEJKO, ALEXANDER KOSOVICHEV, New Jersey Inst of Tech, NAS NASA ARC TEAM[2] — In our work, we use a 3D global MHD model to accurately reproduce the structure and long-term pattern of the solar magnetic dynamo. We use the EULAG-MHD (Smolarkiewicz & Charbonneau, 2013) code to simulate a full spherical shell (0.61 R - 0.96 R) over which we map an ambient profile for a polytropic ideal gas in a superadiabatic state to induce the kind of convection we observe in top 30% of the Sun; we use this to solve for the resulting mass flows with an anelastic approximation of the Navier-Stokes equations. What we have found is that the storage and evolution of the solar magnetic fields can be heavily dependent on the level of turbulent shear that is seen on the surface of the Sun and exhibited by the tachocline layer (Guerrero et al. 2016, Stejko et al. 2017). The structure of these two layers can have enormous impacts on the time-scale of the dynamo evolution as well as the non-axisymmetric emergence of the magnetic field onto the stellar surface. We show that different ambient profiles with different levels of super- or subadiabticity can generate stark differences in the overall pattern of the magnetic field.

[1]NASA NAS team
[2]Advanced Supercomputing Division at NASA Ames Research Center

Andrey Stejko
New Jersey Inst of Tech

Date submitted: 28 Sep 2017 Electronic form version 1.4