Contribution ID: **3** Type: **Poster**

Effect of the nonlinear surface inflows into activity belts on the solar cycle modulation

Converging flows are visible around Bipolar magnetic regions (BMRs) on the solar surface, according to observations. Average flows are created by these inflows combined, and the strength of these flows depends on the amount of flux present during the solar cycle. In models of the solar cycle, this average flow can be depicted as perturbations to the meridional flow. Here, we study the effects of introducing surface inflows to the surface flux transport models (SFT) as a possible nonlinear mechanism in the presence of latitude quenching for two possible inflows profiles, profile (I) as inflows whose amplitudes are fixed in every cycle and profile (II) as in profile (I) but with inflows whose amplitudes vary in time within a cycle depending on the magnetic activity. Using a grid based on one-dimensional Surface Flux Transport (SFT) models, we methodically investigated the extent of nonlinearity caused by inflows and latitude quenching (LQ) and their combination. Results confirm that including surface inflows in the model produces a lower net contribution to the dipole moment (3-12\%) in the presence of the latitude quenching mechanism only. Furthermore, the relative importance of LQ vs. inflows is inversely correlated with the dynamo effectivity range (λ_R). With no decay term, introducing inflows to the model results in a less significant net contribution to the dipole moment. Also, results confirm that inflows profile (II) is more robust and favourable to use in this model.

Primary author: Dr TALAFHA, Mohammed (HUN-REN WIGNER Research Centre for Physics , Dept. of Space Physics and Space Technology)

Session Classification: Coffee break and poster session 1

Track Classification: Solar interior, sub-surface flows and long-term variability