Validation of the energy quantities of the MHD AWSOM model in the low corona using EUV tomography

Diego G. Lloveras[1], Alberto M. Vásquez[1 2], Federico A. Nuevo[1 3], Cecilia Mac Cormack[1], Nishtha Sachdeva[3], W. Manchester IV[4], Bartholomeus Van der Holst[4], Richard A. Frazin[4], Tong Shi[4]

[1]*Insituto de Astronomía y Física del Espacio, CONICET--UBA, Argentina*

[2]*Departamento de Ciencia y Tecnología, UNTREF, Argentina*

[3]*Ciclo Básico Común, UBA, Argentina*

[4]*Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, Michigan, USA*

Abstract: The prediction of space weather conditions requires the advance of three-dimensional (3D) magnetohydrodynamic (MHD) models of the corona and the solar wind. These models involve heating mechanisms to transport energy from the chromosphere to the corona by heating the plasma and accelerating the solar wind. The models need to be validated using observational data, such as using solar rotational tomography (SRT) that allows 3D reconstruction of the thermodynamic variables of the solar atmosphere on a global scale. In this work, the Alfvén Wave Solar Model (AWSoM) is used to simulate the corona and the solar wind. This MHD 3D model uses Alfvén wave dissipation to heat the plasma and accelerate the wind. Using EUV images provided by the SDO / AIA instrument, we reconstruct the coronal electron density and temperature in the range of heliocentric heights r <1.3 Rsun by means of SRT. From these results, we calculate the rates of radiative and conductive loss, and estimate the rate of coronal heating in the lower corona. For this study, we select rotations of the recent minimum of solar activity, between solar cycles 24 and 25. We compare the energetic quantities of the AWSoM model against the tomographic results in different coronal structures.

Acknowledgment:

References:

Session: Solar Physics, heliosphere, cosmic rays (Tuesday)

Oral or Poster: Poster