Geophysical Research Abstracts
Vol. 12, EGU2010-6104, 2010
EGU General Assembly 2010


# A 3D Two-Temperature Solar Wind Model with Alfven Wave Heating

Bart van der Holst
University of Michigan, AOSS, Ann Arbor, United States (bartvand@umich.edu)

The Space Weather Modeling Framework(SWMF), developed at the University of Michigan, is a high performance simulation tool to model a wide variety physics domains ranging from solar corona and heliosphere to the magnetosphere, ionosphere and thermosphere of the Earth and can run these models in a coupled fashion.

We have developed a new physically consistent, three-dimensional solar wind model within the SWMF, that account for the different electron and ion temperatures. We use field-aligned heat conduction for both the electron and ions. The collisions between the electrons and ions are taken into account: Close to the sun the electrons and ions are tightly coupled, but completely decouple beyond approximately two solar radii. In our model, we use Alfven waves to accelerate the wind. The ions are heated by the Kolmogorov dissipation of the Alfven waves. The velocities at 1AU obtained from the semi-emperical Wang-Sheeley-Arge model in combination with conservation of total energy along the field lines determines the Alfven wave amplitude at the photospheric level. We compare this two-temperature model with a one-temperature model for Carrington rotation 2077.