From CMEs to Earth/Lunar Radiation Dosages: a First in Heliospheric End-to-End Coupling. M. J. Gorby[1], N. A. Schwadron[1], J. A. Linker[2], H. E. Spence[1], L. W. Townsend[3], F. A. Cucinotta[4], and J. K. Wilson[1], [1]University of New Hampshire, [2]Predictive Science, Inc., [3]University of Tennessee, [4]National Aeronautics and Space Administration

We have taken fundamental, new steps in coupling MHD simulations to our fully 3D Lagrangian code allowing us to accurately model CMEs and SEP events, and to attain flux and dosage rates out to 1AU. The Earth-Moon-Mars Radiation Environment Module (EMMREM) is a collection of tools based on the output of the Energetic Particle Radiation Environment Model (EPREM) [1]. We feed resulting flux from EPREM into the Baryon Transport (BRYNTRYN) code developed at NASA to calculate dose rates and accumulated dosages.

Recently we have coupled EPREM to Magnetohydrodynamics Around a Sphere (MAS) developed at Predictive Science Inc.. The MAS / EPREM couplings allow us to move past a constant solar wind solution and to realistically model the impact of evolving CMEs on the acceleration of SEPs. Results from both a weak and severe SEP event will be presented, along with a comparison of the results with CraTer and Goes data. Validation of the coupling and the implications for predicting dose rates at 1AU will also be discussed.

Predicting radiation dosages for humans and instruments is vitally important for both current and any future Lunar missions. This critical step in the evolution of code coupling enables us to explore, discover, and ultimately predict connections between SEP events and their effects on the space environment through the inner heliosphere.

[1] Schwadron, N. A. and A. L. Townsend, et al. (2010) Space Weather Journal, Vol. 8, S00E02