

Global Space Environment Modeling with the Integrated Space Weather Prediction Model (ISM)

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The Integrated Space Weather Prediction Model (ISM) is a global space environment model developed under sponsorship of the Defense Threat Reduction Agency (DTRA) by a technical team that comprises industry (SPARTA) and academia (Boston University, Dartmouth College, and Rice University). AFRL also participated during ISM development in an advisory capacity and the model has been used in a variety of scientific investigations sponsored by NASA and NSF.

ISM is unique among global space environment models because it calculates two-fluid (plasma and neutral) magnetohydrodynamics (MHD) equations continuously and without gaps from the bottom of the ionosphere/thermosphere, through the magnetosphere, and out into the solar wind. Other models that simulate the space environment within this volume do so by stitching together regional models of the magnetosphere and thermosphere, with a gap between the lower boundary of the magnetosphere model and the upper boundary of the thermosphere model. Because the ISM computational volume has no such gap and because its MHD equations are essentially statements of mass, momentum, and energy conservation solved on a continuous computational grid, ISM is unmatched in its capability for modeling the global space environment.