EGU22-3816, updated on 12 Aug 2022
https://doi.org/10.5194/egusphere-egu22-3816
EGU General Assembly 2022

Drag-Based Ensemble Model (DBEMv4) with variable solar wind speed input

Jaša Čalogović[1], Mateja Dumbović[1], Bojan Vršnak[1], Manuela Temmer[2], and Astrid Veronig[2]
[1]Hvar Observatory, Faculty of Geodesy, Kačićeva 26, HR-10000 Zagreb, Croatia (jcalogovic@geof.hr)
[2]Institute of Physics, University of Graz, Universitätsplatz 5, A-8010 Graz, Austria

Drag-Based Ensemble Model (DBEM) is a probabilistic model for heliospheric propagation of Coronal Mass Ejections (CMEs) that predicts the CME hit chance, most probable arrival times and speeds, quantify the prediction uncertainties and calculate the confidence intervals. DBEM is based on the 2D analytical Drag-based Model (DBM) with very short computational time. By using CME cone geometry with flattening DBM calculates the CME arrival time and speed at Earth or any other given target in the solar system. DBEM considers the variability of model input parameters by making an ensemble of n different input parameters to obtain the distribution and significance of the DBM results. As an important tool for space weather forecasters, DBM/DBEM web application is integrated as one of the ESA Space Situational Awareness portal services (https://swe.ssa.esa.int/current-space-weather). Important requirement to perform DBM calculations is to assume that two input parameters namely background solar wind speed and the drag parameter γ are constant in order to have the analytical solution and fast computational times. However, this assumption is not always valid in more complex heliospheric conditions. Thus, to further increase the accuracy of CME propagation forecast we developed the new DBEMv4 version that calculates CME propagation in more steps with variable solar wind speeds. This allows also to employ as DBEMv4 input the dynamic solar wind data in real-time taken from simple persistence model under consideration of the CME propagation direction.