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On the combination of ACE data with numerical simulations to determine the initial characteristics of a CME.

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The evolution of the halo coronal mass ejection (CME), which was observed on April 4, 2000, is simulated from the Sun to the Earth by means of a 2.5D (axisymmetric) ideal MHD model. The goal of this study is to combine the Advanced Composition Explorer (ACE) data with numerical simulations to determine the initial characteristics of this CME.

Using a simple initiation model for the CME (an high density plasma blob superposed on the background solar wind) the initial parameters are adjusted to reproduce the ACE data as accurately as possible. The initial parameters leading to the best fit are then assumed to be the most plausible initial parameters of the CME. Despite the relative simplicity of our model, the ACE data are reproduced here with unprecedented precision.

Once the ACE data and the transit time are successfully reproduced, we conclude that, at 1.5 solar radius, the CME had a maximal magnetic field strength of 2.5 10^4 T and a total mass of 6.7 10^{12} kg, and the CME linear speed up to 30 solar radii was 1524 km/s.