

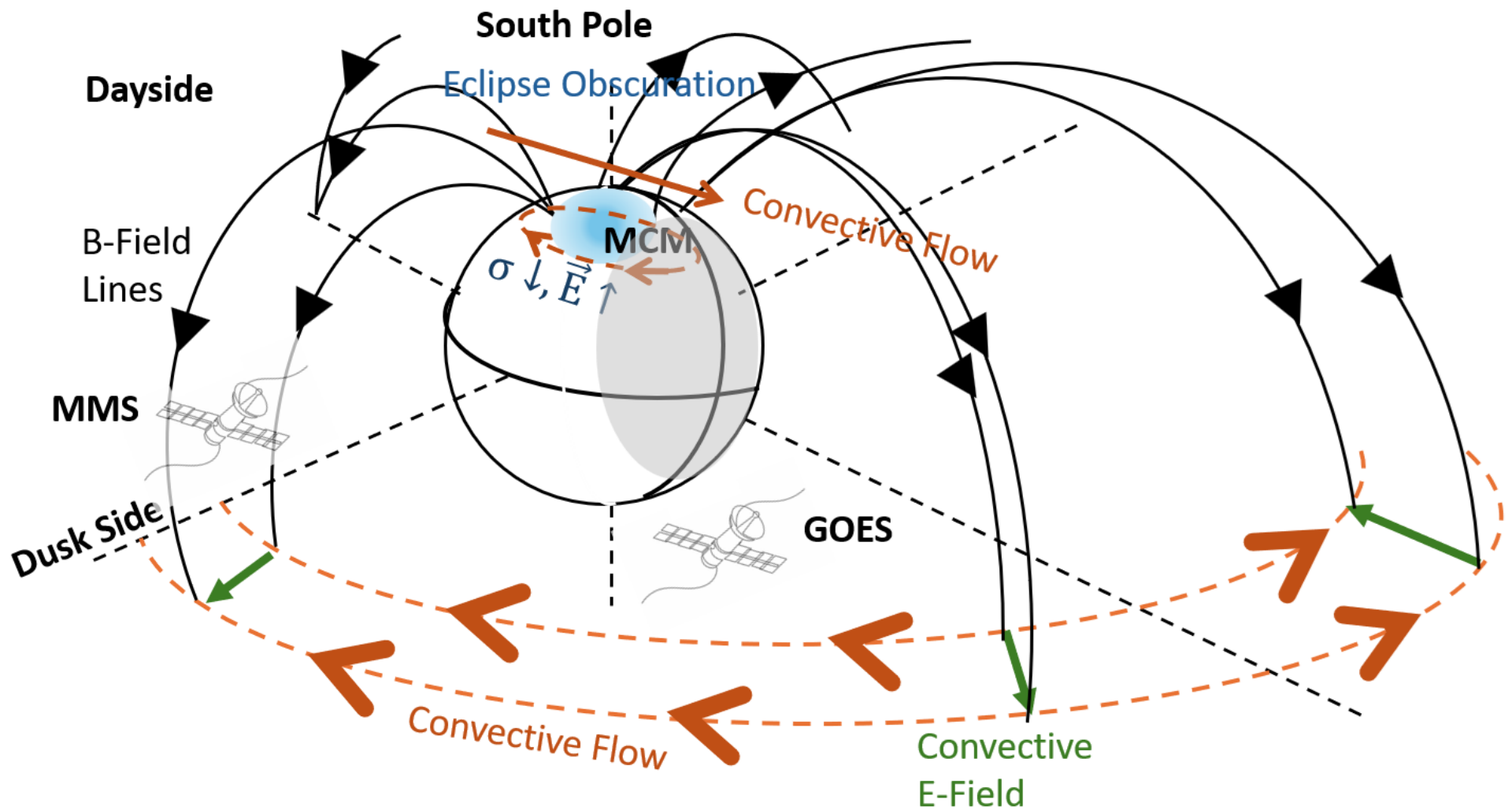


Figure S1. Schematic overview of the 4 December 2021 Antarctic solar eclipse event geometry, illustrating the relative locations of the SuperDARN McMurdo (MCM) radar and the MMS and GOES-17 spacecraft with respect to dayside and duskside magnetic field lines. The blue shaded region marks the eclipse obscuration centered near the South Pole, where reduced ionospheric conductance ($\sigma \downarrow$) and enhanced electric field ($E \uparrow$) are indicated. Orange arrows denote the sense of dawn-to-dusk polar cap convective flow; green arrows indicate the associated convective electric field.