Reconstruction of the magnetic connection from Mercury to the solar corona

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The magnetic foot point of Mercury on the solar disk has been reconstructed for selected case studies, in order to better understand the interaction between the solar corona and the planet. The transport of the magnetic field lines in the heliosphere is here evaluated with a Monte Carlo code that gives a random displacement at each step of the integration along the Parker magnetic field model. Such displacement is proportional to a “local” diffusion coefficient, which is a function of the fluctuation level and magnetic field correlation lengths. The simulation is tailored to specific events by using the observed values of solar wind velocity and magnetic fluctuation levels. Magnetic data from MAG/MESSENGER have been considered to compute the magnetic fluctuation level, while, concerning proton fluxes, FIPS/MESSENGER data has been taken into account. A number of SEP events observed on Mercury during 2011 and 2012 have been analysed, studying, for each event, the magnetic connection from Mercury to the solar corona, and the position of the active region possibly source of the accelerated particles observed.