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Magnetopause structure favorable for radiation belt electron loss

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Magnetopause shadowing is regarded as one of the major reasons for the loss of relativistic radiation belt electrons, although this has not yet been fully validated by observations. Previous simulations on this process assumed that all of the electrons encountering the magnetopause are simply lost into the magnetosheath just as ring current ions can be, and did not examine details of the particle dynamics across and inside the magnetopause which has a finite thickness. In this study, we perform test particle orbit calculations based on a simplified 1-Dimentional magnetopause model to demonstrate specifically how relativistic electrons arriving at the prenoon side of the magnetopause can be lost. The calculation results indicate that the loss process is sensitive to the existence of two factors: (i) a gradient of the magnetic field magnitude, B, along the magnetopause and (ii) a component of the magnetic field normal to the magnetopause.