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Behavior of Energetic and Thermal Electrons near the Magnetic Reconnection Region

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By using the Geotail spacecraft data, we study plasma heating and acceleration around the magnetic reconnection region. We carry out the superposed analysis of the thermal temperature and the energetic electron flux (> 38keV) as a function of distance from the X-/O-type neutral line, for three regions of the near-Earth, the plasmoid and the distant magnetotail. In the near-Earth reconnection region, thermal electrons are effectively heated near the plasma sheet boundary layer rather than inside the central plasma sheet, and the highest intensity of energetic electrons flux can be found at the outflow region away from the X-type neutral region. The intensity of energetic electrons flux is much higher in the earth ward flow region than in the tail ward flow region. However, there is no clear difference between the earth ward side and the tail ward side in the distant tail reconnection region. For the plasmoid case, the energetic electrons flux intensity is much higher in outer region of plasmoid where the magnetic field lines are piling up. From these analyses, we argue that a part of energetic electrons can be produced near the X-type point, but more importantly the most of energetic electrons are accelerated in the entire reconnection region surrounding the X-type point.