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Inner plasma structure of the low latitude reconnection layer

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We report a clear transition through a low-latitude reconnection layer which shows a complete traversal across all reconnected field lines and the associated plasma populations, confirming details of the electron and ion mixing, time history and acceleration through the current layer, during north-westward interplanetary magnetic field (IMF) conditions. With a strong guide field, the reconnection layer has a single density cavity on the magentosheath side with super-Alfvénic nearly field-aligned manetosheath flows. In the reconnection layer, there are four sharp plasma boundaries, associated with the separatrices (Ssp and Ssh) and Alfvén waves (or Rotational Discontinuities (RD), RDsp and RDsh) on the magnetosphere and magnetosheath sides. There are deemed to be launched from the reconnection site and confirm the time elapsed since reconnection. In each sublayer between the boundaries the plasma distribution is different. We show convincing evidence for a velocity dispersion effect in the electron anisotropy that is consistent with the time elapsed since reconnection of the given field lines crossed. We further give new evidence for the occurrence of partial reflection of magnetosheath electrons at the magnetopause.