Magnetic reconnection induced by weak Kelvin-Helmholtz instability and the formation of the low-latitude boundary layer

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We show the new results that magnetic reconnection induced by the flow of Kelvin-Helmholtz Instability (KHI) causes the plasma mixing at the Low-latitude Boundary layer (LLBL). In this study, we have performed two-dimensional two-fluid simulations including finite electron inertial effects to investigate the role of a KHI on the formation of the LLBL. The results from a case in which in-plane magnetic component is anti-parallel across the shear layer indicate that KHI induces magnetic reconnection as it squeezes the current sheet in its early phase. Reconnection is triggered even when the Alfven Mach number of the shear (M_A) is small. The reconnection process then assists the vortex to highly roll-up to cause large scale plasma mixing. The results imply that the combination of anti-parallel geometry and low M_A may play an important role in the formation of the LLBL. Indeed it is shown that for a realistic LLBL situation under northward IMF the combination is achieved rather commonly.