

## Estimations of Diffusion Regions in Global MHD simulations

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It has been widely believed that reconnection takes place around the diffusion regions at the dayside magnetopause of the Earth magnetosphere. However, nobody has ever succeeded in visualizing the reconnection phenomenon in Global MHD simulations.

We have constructed a system on the NICT science cloud that traces each magnetic field lines in the 3D space of Global MHD simulations. The tracing method is based on an assumption of frozen-in of plasma to magnetic field lines. It implies that we cannot trace in the vicinity of the diffusion regions. In order to recognize the region and timing of the dayside magnetic reconnection, thus, we need to examine the diffusion ratio around the Earth magnetosphere.

In the present study, we estimate the diffusion ratio using the break of the frozen-in assumption. We first estimate an amount of magnetic flux around an arbitrary point. We then trace the point, and magnetic flux around the point. The diffusion ratio herein is estimated by the change from the initial flux.

Our estimation indicates that the diffusion regions are located widely upper and lower side of the magnetic equator. The range area is more than 5  $R_e$  from the equator. It suggests that the reconnection takes place on at a certain point but around the wide area in front of the magnetosphere.

Keywords: Global MHD simulation, diffusion region, magnetic field line, 3D visualization, reconnection