

Analysis of Diffuse ion events and their related waves upstream of the Earth's bow shock.

Tadateru Yamamoto[1]; Toshio Terasawa[2]; Toshifumi Mukai[3]; Yoshifumi Saito[4]

[1] Earth and Planetary Sci., Univ of Tokyo; [2] Dept. Earth Planetary Sci., Univ. of Tokyo; [3] ISAS/JAXA; [4] ISAS

Diffuse ions observed upstream of the Earth's bow shock have a broad angular distributions with energies from just above the solar wind energy to about 200keV per charge. Diffuse ions are accompanied by large amplitude low frequency magnetic waves in the frequency regime 0.01~0.03Hz. And these waves are probably Alfvén waves locally generated by ion cyclotron resonance interaction with upstream ions. At the same time, scattered by these waves, ions get diffused and some ions go back to the shock. Repeating this process, the diffuse ions are accelerated(diffusive shock acceleration).

To understand acceleration effect at the Earth's bow shock, it's impossible to ignore upstream physics, because they decide whether ions come back to or escape from the shock, that means they affect the efficiency of the shock acceleration. So in this study, we have concentrated mainly on spatial variations of the diffuse ions and their related waves to understand how the diffuse ions move.

Using GEOTAIL, We have made statistical analysis about spatial variations of the diffuse ions and their related waves in wider region than previous studies that were made near the shock. We have found a slightly different result. And we try to explain these results with a simplified model.