

Radiation characteristics of AKR - Verification by three-dimensional ray tracing -

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It has been understood that a very strong radio waves are radiated above the aurora region. This radiation is called "Aurora kilometer Radiation (AKR)". The source region of the radiation, the propagation of the waves in the magnetosphere are not still well-understood. Now, simultaneous AKR data by two or more satellites become available which is useful to experimentally clarify the AKR source and propagation. In this paper, we constructed the 3-D ray-tracing method employing the IGRF-10 and recent plasma distribution model by Sato(2000).

We performed experiments by using observed AKR by both Geotail and Polar satellites on the December 26 1996 and January 6, 17, 25-29 1997. The obtained characteristics of AKR in the magnetosphere are as follows:

1. R-X mode AKR is radiated in the condition of $f/f_{R-X} > 1.04$.
2. L-O mode AKR is observed in the low latitude, and R-X mode is observed in the high latitude.
3. The radiation beam-width (θ_B) at the excitation source of the L-O mode is suggested from the experiment to be $75^\circ < \theta_B < 105^\circ$ [degree].
4. The propagation characteristic of AKR is the most sensitive to the density distribution.
5. Most of AKR observed by Geotail is L-O mode.
6. AKR observed by Polar shows the R-X mode when the Polar satellite is in the high latitude, and observed in L-O mode when the satellite is in low latitude.
7. The extent of AKR source in Local Time direction is suggested to be not restricted in the bright UV aurora region but be widely distributed in the oval.
8. It is suggested that L-O mode AKR and R-X mode AKR are radiated simultaneously at the same time from the comparison of the observations of the Polar and Geotail both satellites.