IMF dependence of AKR sources

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Interplanetary magnetic field (IMF) dependence of auroral kilometric radiation (AKR) sources has been investigated based on the 14-years plasma wave data obtained by the Akebono satellite. For each season and hemisphere, spatial distribution of occurrence probability of AKR sources is calculated as functions of IMF-By and Bz directions. In order to avoid the far AKR sources from the satellite, occurrence of AKR was determined by intensity larger than -150dBW/m^2 Hz within a frequency range between electron cyclotron frequencies at the satellite and 2000 km below the satellite. The calculated distribution shows distinct dependence on IMF-Bz direction. When IMF-Bz is negative, occurrence probability of AKR sources increases and distribution extends to low latitude. Furthermore, spatial distribution of AKR sources also depends on IMF-By direction. When IMF-By is positive (Away), the occurrence peak of AKR sources is located around 2100 MLT in the northern polar region while it is located around 0000 MLT in the southern polar region. Symmetrically, when IMF-By is negative (Toward), the occurrence peak of AKR sources is located around 0000 MLT in the northern polar region while it is located around 2100 MLT in the southern polar region. The occurrence peak around 2100 MLT is larger than that around 0000 MLT in both cases. The IMF-By control is seen independently of season and IMF-Bz direction. As for the correlation between AKR and IMF-By, it was pointed out by Gallaghar and D'Angelo [1981] that AKR intensity was enhanced when IMF-By is positive. They explained that AKR were scattered by the fluctuations in the magnetosheath produced by the corotating interaction region (CIR) in the solar wind. It seems, however, that the phenomena should be reinterpreted by the results shown in the present study. IMF dependence of AKR is considered to be associated with that of upward field-aligned current (FAC), as shown by Weimer et al [2001] and Papitashvili et al. [2002], because current density and ambient plasma density are probably important control factors of AKR source occurrences.