

Possible effects of long-term variations of Jovian decametric radiation

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Jovian decametric radiation (DAM) has been well known short-term variations depending on the CML and the Io-phase angle. On the other hand, the occurrence probability of ground-based DAM observations varies depending on an eleven-year or a twelve-year cycle. Studies on the mechanism of long-term variations have been initiated by the discovery of the anti-correlation with the sunspot number by Carr et al.(1961). But afterward, it has been thought that long-term variations have depended on the geometrical effect due to the change of DE (the jovicentric declination of earth).

We analyzed long-term radiometer database obtained at Zao observatory of Tohoku University to discriminate the dependence on the solar cycle and DE variations, with eliminating the variation due to the observation condition on the ground.

We examined the shielding effect of the terrestrial ionosphere, the effect of the change of the distance from Jupiter to the Earth, and the effect of the change of the Galactic background noise level. We were able to evaluate these effects on the occurrence probability of DAM. As a result, we can conclude that both Io-DAM and non-Io-DAM occurrence probabilities have dependence on the solar cycle. The non-Io-DAM variation includes clear DE effect.

Because the solar cycle variation has an anti-phase to the solar activity, there is possibility of the existence of the variations of the plasma density in the Jovian polar ionosphere as it has been reported for the variation tendency of the AKR (Kumamoto et al., 2003).