Mechanism of Jovian Decameter Radio Wave Emission Components Caused by SL-9 Comet Remnant Dust Groups

Hiroshi Oya[1]

[1] Space Commu. Fukui Univ. Tech.

1. Introduction

The effects on Jovian decameter radio wave emissions that have been caused by dust which have been originated from Shoemaker-Levy 9 comet nuclei have shown evolution due to change of distribution feature of dusts in the Jovian magnetosphere. In the present work, the source mechanism of the dust effects on the Jovian decameter wave radiations is clarified by observing dynamic spectra of the so called multi-coherent emissions of Jovian decameter wave emissions that are strictly related to the comet origin dust effects, in addition to detection of the continuous depression stage of the Jovian decameter radiation.

2. Multi-coherent Emissions—Review

During the periods of S-L 9 comet crash to Jupiter, peculiar radio emissions that had finally been concluded as coming from Jupiter were identified. Those kinds of emissions are characterized by trains of rather weak level pulses that repeat frequently with interval of several seconds. For the case of a long base line interferometer with baseline length of 100km range, the majority of pulses depart from proper phase position of the reference interferometer fringes that were decided for the radiation from Jupiter. Even the phase positions of emissions had made large excursion from the regular fringe position, the emissions had been identified as coming from Jupiter considering following check points: 1) Averaging values of the correlation between two slightly different frequencies of the interferometer show the fringes calculated for the emissions from Jupiter corresponding to a short baseline interferometer. .2) Appearance feature of the emissions in the CML-Io phase diagram shows clear dependence on CML position.

3.Observations of the Dust Effects and Dynamic Spectra

We have continued the observations of Jovian decameter wave emissions by the Awara Jovian decameter radio wave observation facility of Fukui University of Technology. The results have shown current depression of the Jovian decameter radiations; it is then supported that the dust groups are reducing their existing altitude to the level of the decameter radio sources and are impeding the emission processes at the sources in the Jovian topside ionosphere.

In parallel to such confirmation, we have also made of the observations of the dynamic spectra of the multi-coherent emissions, though the chance of the observations of the multi-coherent emissions is extremely reduced. The observation results of the dynamic spectra show that there are remarkable characteristics of the multi-coherent related emissions. That is, the clear straight line feature of the narrow band emissions in the dynamic spectra have been identified within the frequency range from 22MHz to 27MHz with falling tone of the frequency.

4. Discussion and Conclusion

The straight line feature of the dynamic spectra shows the movement of the radiation sources starting from the level of approximately 2500km above the Jovian cloud top(JCT) and ending around the level of about 4000km of JCT within approximately 40 sec with average velocity of 38km/sec. The repeated production of sources are made with interval of about 10 sec. For this phenomena, processes of formation of the double layers along the magnetic field lines where the groups of comet dusts are crossing , in the magnetosphere, are concluded; i.e., moving double layer regions become sources of the multi-coherent emissions caused by comet origin dusts.