Reinvestigation of Extremely Large Enhancements of Jovian Decameter Radiation due to the Fragments of Shoemaker-Levy 9 Comet

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1. Introduction

In the period of the crashing of fragments ofSL-9 comet with Jupiter, extremely large enhancement of Jovian decameter radiation was observed by the Decameter radio wave observation station of Tohoku University, in July, 1994. Though the evidences had been reported by the study group of Tohoku University (Oya et al, 1997), no other report was made, except for Chinese group at Beijing mostly because of erroneous selection of data as to be atmospherics or mixing of man made signal due to abnormally large enhancement of decameter wave radiations. The purpose of the present study is to make reinvestigation of the data in the period of the passage of the comet fragment through the magnetosphere as well as the crash into dense Jovian atmosphere. Even the Tohoku study group (Oya et al,1997) recognized the effects of S-L 9 comet on the enhancements of Jovian decameter radiation, they had still overlooked important evidences of the enhancements because of such abnormal feature of the decameter wave radiation.

2. Origin of Multi-Coherent Emissions

The most remarkable characteristics of the enhanced Jovian decameter wave radiation is the appearance of the emissions which are deviated from the expected fringe phase of the interferometer as if the emissions were not coming from the single source at Jupiter. The origin of this deviation was interpreted as the effects of interaction between the coherent sources along the field aligned acceleration region caused by the generation of electric fields due to the interaction of the cemetery dusts associates with fragments between the magnetic fields in the Jovian magnetosphere. After reinvestigation of the data of long base line interferometer of Jovian decameter radio waves observed at Tohoku University in July 1994, it has been clarified that the multi coherent emissions are caused by the observations of two sources together or individually being switched between the radio wave sources located in the regions close to north and south magnetic poles of Jupiter. Many of data which were thought as the atmospherics or mixing of man made signals are correctly confirmed as to be decameter wave radiations from Jupiter which were enhanced by the passage of cosmic dusts associated with fragments of SL- 9 comet.

3. Identification of N-S Swing Bursts

Among the data which were discarded as man made signal interaction, the evidence of S-N Swing Burst has been identified; the burst was characterized by periodic switching of the source positions between north and south decameter radio sources alternately with the period of about 30 sec. This evidence indicates that the Alfven waves generated by interaction of cosmic dusts with magnetic field, propagate back and forth along the magnetic field line triggering the precipitation of the energetic particles by locally generated induction electric fields.

Reference

Oya,H., M.Iizima,M.Morioka,and H.Murao, Extremely Large Enhancement of the Jovian Decameter Radio Bursts Caused by the Magnetoshere-Plasmasphere Passages of Shoemaker-Levy 9 Comet Fragments–Evolution of Jovian Decametric Radiation Feature into the State of Intense Decametric Pulsar, J. Geomag.Geoelectr.49, S49-S66, 1997