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Section 5. Atmospheric Radio Noise and Thunderstorms

A few tens of data near thunderstorms within approx. 20km were observed in summer of 1983, each being the aggregate of envelope crossing rate distributions (CRD's) measured simultaneously from a single noise sample of a few minutes duration at four measurment frequencies, 2.5 kHz, 3.5kHz, 5 kHz and 8 kHz. The significant feature is that any CRD is separated into two parts, one is the lower amplitude part contributed by K-change pulses, and the other the higher amplitude part contributed by return stroke pulses. The low amplitude part can be adapted by a straight line on log-log graph which is labeled as the field strength and as the average number of crossings per second. The linear(straight line) characteristics of CRD suggest that the sources of K-change pulses are likely to be distributed uniformly over the distance range from an observer. On the other hand, the high amplitude part of CRD is expected to be closely correlated with the Fourier frequrncy spectrum of return stroke pulse-waveform. Studies of the characteristics of CRD in the high and low field strengths at the four frequencies are in progress.

For the purpose of investigating the noise characteristics from a bullet train running a railroad with appreciable slope, measurements of radio noise emitted from Shinkansen were made several times in November and December in 1893. A measuring point was selected near the railroad in Koda city, where train-speed acceleration and deceleration can be expected in observing a bullet train running the upward slope and downward slope, respectively. A significant phenomena was found that there exists a remakable difference in pulse-generation mechanism between the bullet train running the upward slope and one running the downward slope. A paper describing the results of measurments was submitted to EMC'84/Tokyo.

Return stroke characteristics of the lightning flash triggered with rockets and a tall chimney were investigated based on the data obtained during the winters of 1981 and 1982. One remakable feature of the triggered lightning is a large number of component strokes compared with that of natural flashes. The lightning strokes of triggerd lightning are divided into two types concerning the electric field change due to the strokes and the luminosity change of the stroke channel. One has no rapid change and another rapid change as fast as natural ground flashes. The time intervals between successive strokes of the 50 triggered strokes out of 101 were less than 6 ms. It is very different from the time intervals between return strokes of natural flashes. It was found that there are some relationships between the characteristics of the electric field change due to stroke and the light intensity of the preceeding stroke.

We recorded luminosity changes with time and height of return stroke channels to find the propagation velocity of the return stroke current and some characteristics of the lightning channel. The recorded data are under analysis.

The Norwegian winter thunderstorms were observed this winter as well as the last winter. Seven thunderstorm days were recorded during the two winters. Though the preliminary report on the last winter was already publised, most of analysis are not finished yet. This project was cooperration with Saitama University and EFI, Trondhiem in Norway.

We did not succeed to find any warm thunderstorms at Ponape, Micronesia during the expedition in 1982, though we observed warm rains.

A method for estimation of a return stroke current from the electric and magnetic field changes on the ground was developed using Lin-Uman-Standler's model for a return stroke current. It was confirmed that the method could be applied to estimate actual return stroke current from field change records.

Takeuti reported "On the oscillating bipolar return stroke current" at the International Aerospace and Ground Conference on Lightning and Static Electricity held at Fort Worth, Texas, U.S.A. on June, 1983.

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