

Development of the 256-element imaging riometer -Efforts to detect very small CNA-

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In order to observe two-dimensional CNA (cosmic radio noise absorption) with high spatial resolution, the 256-element imaging riometer was developed and installed at Poker Flat Research Range in Alaska in October of 1995. It has been successfully operated since then. CNA in the polar region is mainly produced by high-energy particle precipitations into the lower ionosphere. The intensity of the CNA depends not only on the energy spectrum and flux of the energy particles but also on the density, temperature, and composition of the neutral gases. So, CNA might give us various information on the interaction between high-energy particles, ionosphere, and neutral gases. To investigate such information in CNA, however, it is necessary to detect very small-amplitude variation of CNA. The 256-element imaging riometer is designed to be able to detect CNA as small as 0.05 dB. But it has some problems to resolve before reaching this sensitivity. They are (1) leakage of the radio noise signal of the previous beam channel to the following beam channel, (2) CNA calculation error due to the system noise, (3) CNA variation due to the temperature variation of the receivers. We are now making effort to cope with the problem (1) by improving the electric circuit of the receivers, the problem (2) by rejecting the system noise effect from CNA calculation algorithm, and the problem (3) by the correction using the relation between the CNA and temperature of the receiver.