

長波帯計測用、自己較正機能付き高感度直交ループアンテナの開発とその応用例

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Development of a Self-Calibrating, Highly Sensitive LF Crossed-Loop Antenna and its Application

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We developed a self-calibrating, highly sensitive crossed-loop antenna for the purpose of reception of low frequency (LF) radio waves. The antenna consists of orthogonally crossed, larger double loops RX, RY and smaller ones TX, TY (Figure 1). The former loops receive LF radio signals, the latter transmit a weak signal for calibration purpose. The loop antenna (RX, RY) is azimuthally omnidirectional within 0.1 dB μ V. The self calibration test is performed by transmitting a weak LF signal for an instant every an hour from the transmitter TX and TY respectively, and receiving the signal from the receivers RX and RY to obtain the preassigned field strength. This test allows us to obtain reliable measurements.

We apply this self-calibrating loop antenna to receive the standard frequency and time signals JJY of LF 40 kHz and 60 kHz during 2013 Shirase, the Japanese Antarctic research vessel, training cruise around Japan. Figure 2 shows the preliminary result of temporal evolution of the field strengths JJY 40 kHz, 60 kHz and self-calibrating radio signals. The field strength of the self calibration test shows about a consistent preassigned value, assuring the measurements. In the presentation we report results of a more detailed analysis.

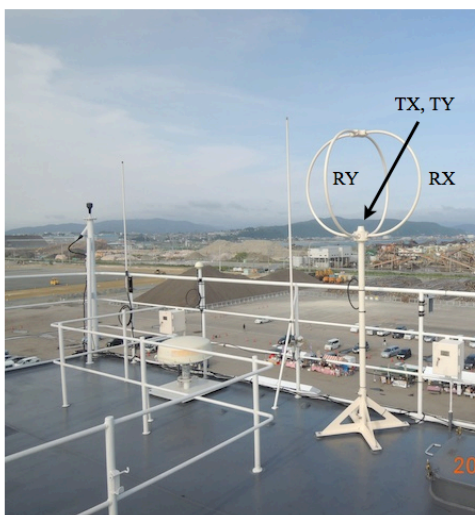


Figure 1. A crossed-loop antenna.

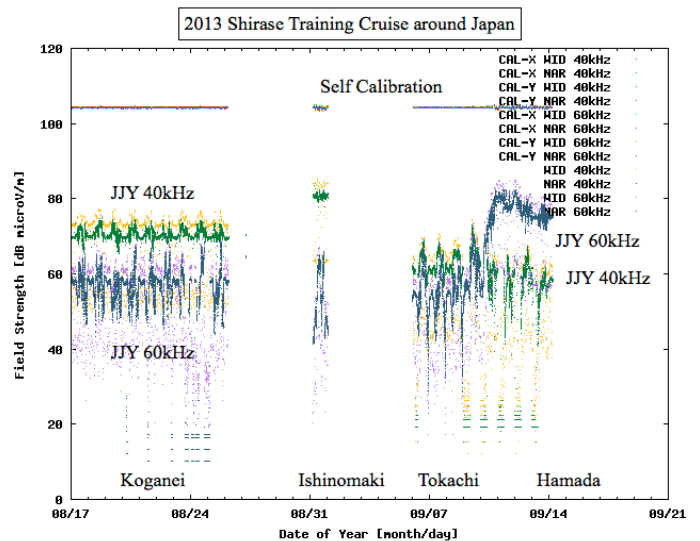


Figure 2. Temporal evolution of field strengths.