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VLF-measurement with orthogonal loop antennas and data analysis in complex plane

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Natural and man-made emissions in ELF-VLF band are often measured by using orthogonal loop antennas. In the recent Sodankylä Geophysical Observatory receivers multi-turn loops with turn area products varying from 50 to 2300 m² have been used. Matching between antenna and preamplifier has been arranged by two pole band pass filter, which allows the exact and easy control of antenna band pass response. Parallel amplifier solution prevents need for transformer in the front end. Although digital filters in the used 24-bit AD converters finally guarantee the needed rejection at and above Nyqvist frequency effective analog filtering has been included in analog part.

Analysis has been written in complex plane and all information on polarization ellipse and power at every point in time-frequency grid has been solved. Analysis package contains filtering using power level, polarization and apparent angles of arrival. Special filters against sferic background can be used in different ways for helping in getting the wanted estimate as good as possible.

The used solutions are described and examples on the obtained results are given.