

# Remote Sensor Data Transmission from Antarctica to Spain with a long-haul HF ionospheric link

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## The link

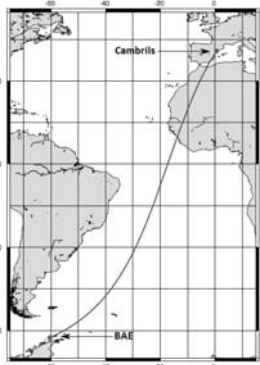


Fig 1: 12760 km link map  
BAE: Spanish Antarctic Station

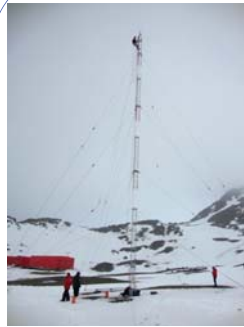


Fig 2: Ionosonde antenna



Fig 3: Geomagnetic sensor

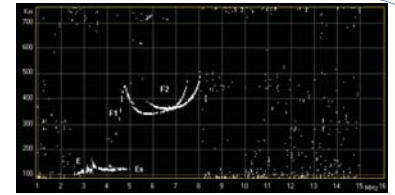


Fig 4: Ionogram showing F1 and F2 layers reflections

Fig 5: Geomagnetic sensor



## Remote sensing

## Sounding results

Fig 6: Measured SNR

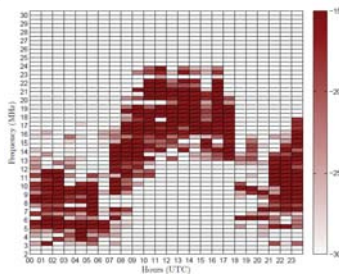


Fig 7: Doppler shift measured during all day

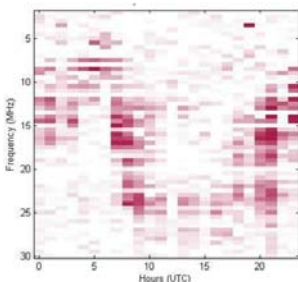
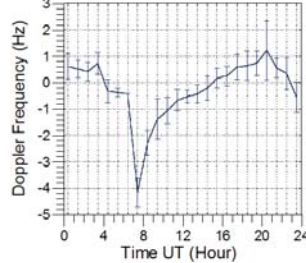


Fig 8: Narrowband availability for frequency range [3,30MHz]

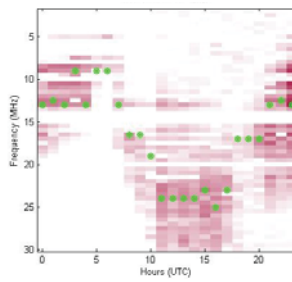
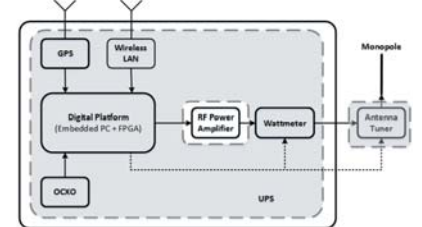


Fig 9: Wideband availability for frequency range [3,30MHz]

Fig 10: Transmitter diagram



## System description

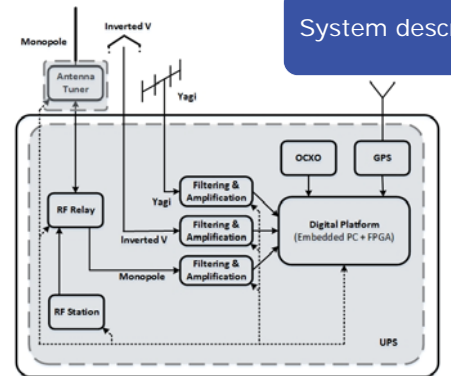


Fig 11: Receiver diagram

## Modulation results

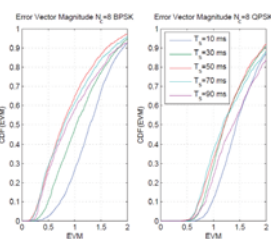


Fig 12: Cumulative Density Function of EVM in a OFDM modulation

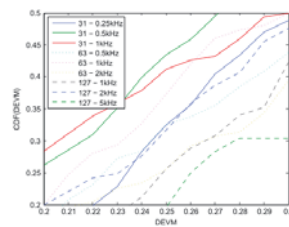


Fig 13: Cumulative Density Function of EVM in a DS-SS modulation

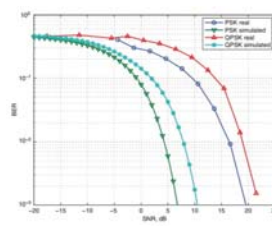
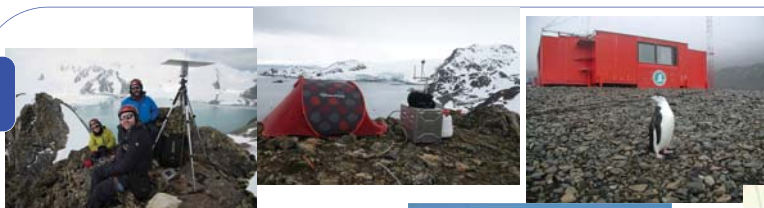


Fig 14: BER vs SNR in a SC-FDE modulation

## REFERENCES

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## The places



## Cambrils

## BAE

