COVERAGE

PREDICTION

NAVTEX

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Abstract

Radio coverage predictions are provided for the NAVTEX transmitter installed in Mindelo, Island Sao Vicente, Cabo Verde.

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1 MF Radio Coverage

The coverage prediction for the MF radio communication system (Navtex transmission) is based on the ITU-R Recommendation P.368-7. It consists of field strength prediction during daylight, assuming ground-wave propagation only. The terrain effect is taken into account by means of a 5-minute resolution database. The coverage is determined with a resolution of 5 km in range and 5° in azimuth.

1.1 Assumptions

The parameters used for calculating the coverage prediction are detailed in Table 1.

Parameter	Value
Frequency	518 kHz
Transmitted power	1 kW
Transmitter antenna gain	2 dBi, omnidirectional
Transmitter effective antenna height	45 m above sea level
Antenna efficiency	65 %
ATU efficiency	80 %
Sea path characteristics	sea water, average salinity $\sigma = 5$ S/m, $\varepsilon = 70$
Land path characteristics	dry ground $\sigma = 3\ 10^{-4}$ S/m, $\varepsilon = 7$
Receiver antenna factor	-22 dB.m (typical value for marine MF antenna, corresponding to a 0.08 mV output in 50 Ω at a field strength of 1 mV/m)
Receiver effective antenna height	10 m
Receiver antenna polarisation	vertical

Table 1 Parameters used for MF coverage prediction

1.2 Prediction results

Figure 1 shows a map with the contours of the received MF signal at 518 kHz, expressed in dBμV. The contours are plotted with a resolution of 10 dBμV, from –10 dBμV to 50 dBμV. The transmitter is located in Mindelo (16.8833°N, 25°W).

For a typical ship receiver sensitivity from 2 μV (6 dBμV) to 1 μV (0 dBμV), the sea-path coverage range varies according to the direction between 221 NM and 416 NM, as shown in Figure 2.

The average coverage of the 1 kW transmitter is about 300 NM for a worst case receiver sensitivity of 2 μV. It can be predicted that the transmitted power could be reduced by about 3.76 dB (420 W instead of 1 kW) in order to limit this average coverage to 250 NM.

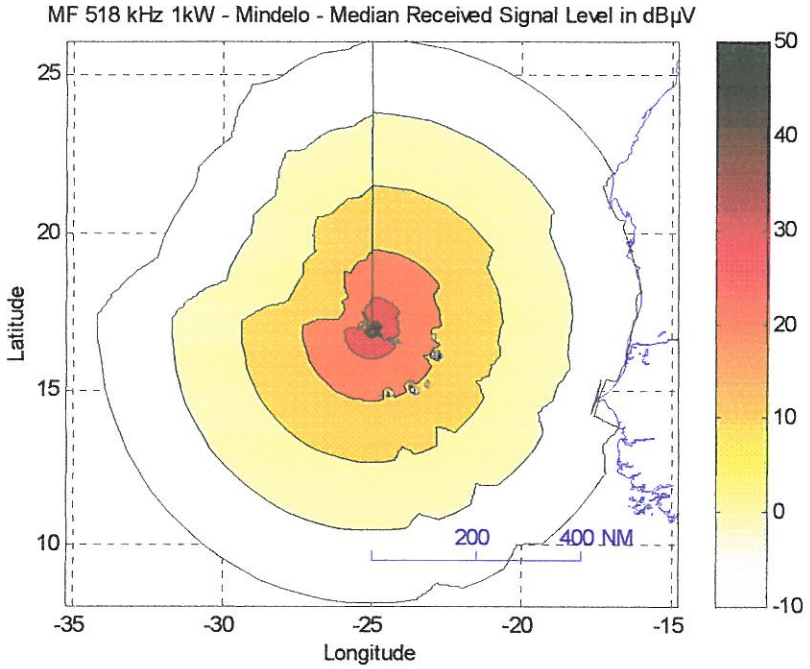

Figure 1 Map with the contours of the received 518 kHz Navtex signal level in dBµV

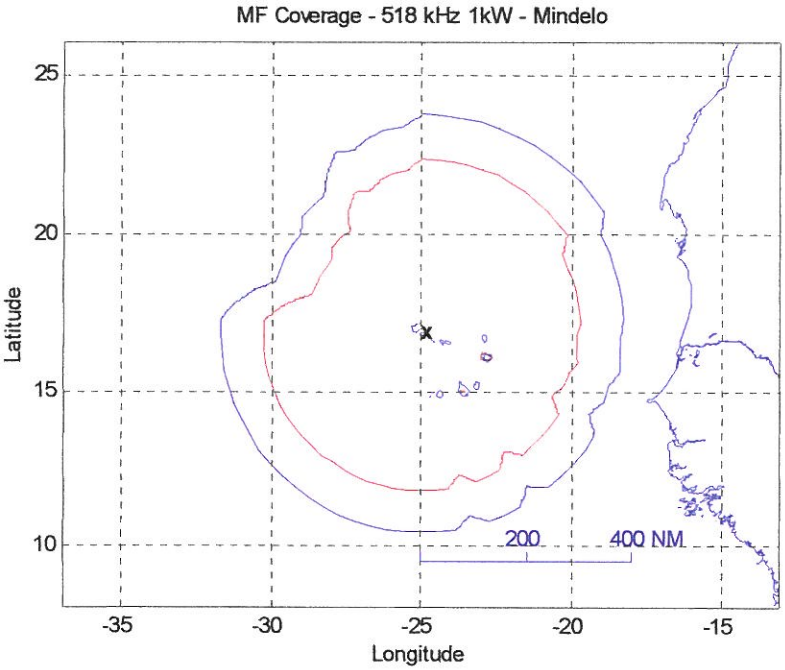

Figure 2 Navtex coverage around Cabo Verde for a receiver sensitivity of 0 dBµV (blue) and 6 dBµV (red)