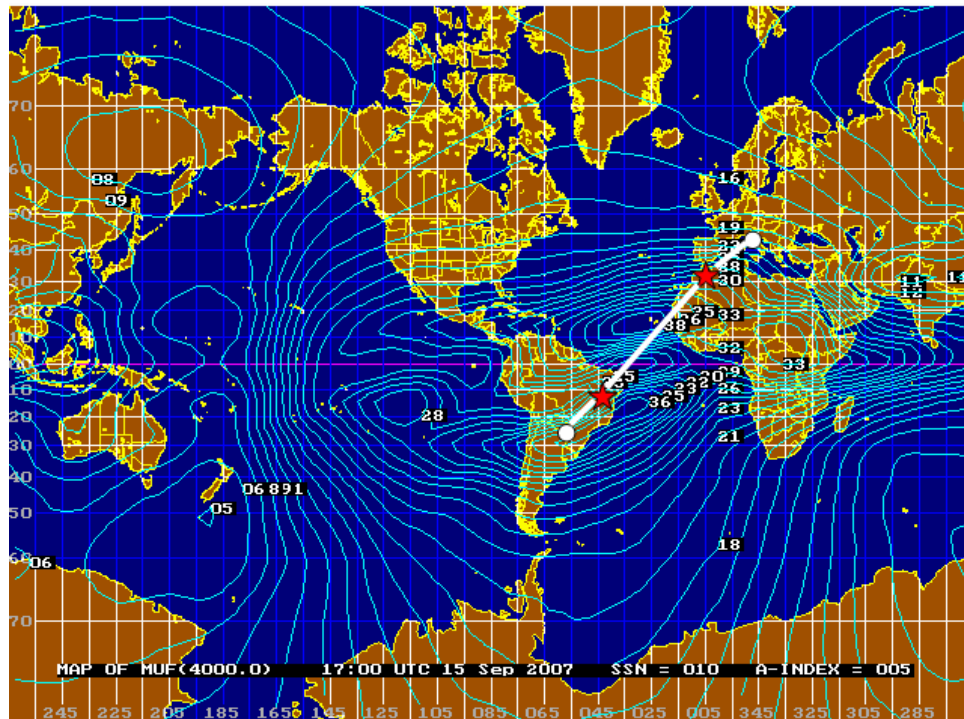


The Robust Equatorial Ionosphere
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ZP6CW's comment in last week's *QRX DX* about his openings to Europe on 10m highlights the fact that the equatorial ionosphere is very robust. Although we're at solar minimum between Cycles 23 and 24, the ionization in the equatorial region can be high enough at certain times to support F₂ propagation on 10m.

The following is a world map (from Proplab Pro) of monthly median maximum usable frequencies (MUFs) for 4000km distances for September 2007 at 1700 UTC at a smoothed sunspot number of 10.



The white dot in South America is ZP6CW. The white dot in Europe is Italy. The thick white line is the short great circle path between ZP and Italy. The red 5-pointed star to the northeast of ZP6CW is an ionospheric control point 2000km out of ZP6CW. Likewise, the red 5-pointed star to the southwest of Italy is an ionospheric control point 2000km out of Italy.

For long distance paths, our propagation prediction programs use the control point method of predicting propagation. Empirically it has been observed that propagation usually does not fail until ionospheric control points, along the great circle path near each end of the path, fail to support transmission. For F₂ region propagation, these control points are 2000km from each end of the path (where a low elevation angle electromagnetic ray would encounter the F₂ region of the ionosphere on a 4000km hop).

Although it's kind of tough to read the labels on the contour lines, the monthly median MUFs at both control points are predicted to be near 30MHz – thus indicating that there's a good probability of 10m propagation from ZP to southern Europe. In fact, VOACAP predicts an opening from 1200 UTC to 1900 UTC, with the best probability (slightly greater than half the days of the month) being around 1700 and 1800 UTC. Propagation from ZP to northern Europe would not be as good since the control point on the northern Europe end would move farther north to contour lines of lower MUF.

What about ZP6CW's comment about 5 days of zero sunspots, yet he had propagation? We have to remember that sunspots, just like 10.7cm solar flux, are a proxy for the true ionizing radiation – which for the F₂ region is radiation at wavelengths of roughly 10 to 100 nm (which ionizes atomic oxygen).