Argos Performance in Europe
Part 2

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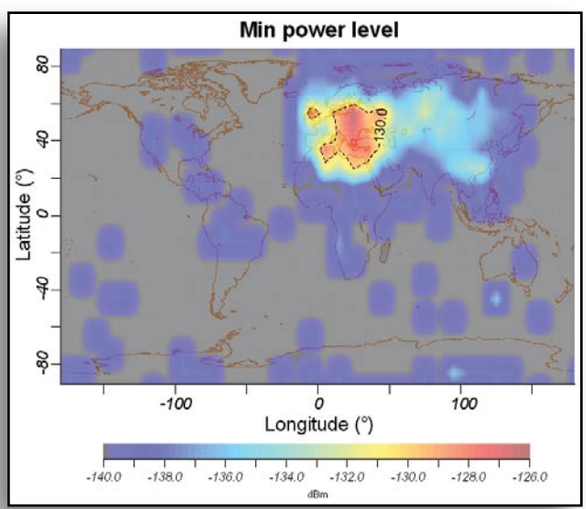
In "Tracker News" of winter 2005, Volume 6, Issue 2, an article spoke of the Argos performance in Europe. In the article below, the CLS group, operator of the Argos system, describes the status of investigations on this topic. Two main points are emphasized: first, estimating the mean level of noise in the European Region and, second, seeking discrete noise sources.

Estimating the mean level of noise in Europe

This study takes advantage of the message dating and reception power level measurement (in dBm) capabilities of the Argos system. By combining this information with the precisely known satellite orbits, it is possible to link a date to a geographical position on the ground track for each Argos message received and produce a map (see figure below) of the minimum power levels received over the earth.

A specific set of measurements was made in late 2005. The results clearly show that, in the European region, the Argos instruments onboard the satellites are receiving a broadband noise with significant amplitude covering the total Argos frequency range. This noise makes it difficult to demodulate Argos messages that are reaching the satellite at a level of about -130 dBm or less. We are currently investigating the source of this noise.



Geographical distribution of the minimum power level of the messages received by the Argos satellite.

Recall that the transmission power of your PTT is typically specified as the power at the amplifier output. Losses occurring in the link to and through the antenna will generally cause the actual radiated power to be less than the amplifier output. In general, Argos signals are received at the satellite at levels from -105 dBm (for high power PTTs) to -140 dBm (for very low power PTTs). The test results show that in the European Region, the lower power Argos signals are hidden by the noise.

The tests also indicated that some 0.5 watt PTTs are sometimes received by the satellite at -122 dBm, and sometimes at -130 dBm. Thus, the transmission conditions, including, for example, the quality of the antenna, position of the PTT on the Argos platform, etc. have a big effect on the signal level actually received at the satellite.

The test results suggest that currently, Argos transmissions in the European Region at 0.5 W or more will result in a higher probability of better reception by the satellite. It is still possible, nevertheless, that good results can still be obtained, under certain conditions, at 0.25 W assuming the antenna is well adapted and the PTT is situated in places offering good transmission conditions.

Seeking discrete noise sources

The Argos-2 instrument on the satellites can also detect discrete noise sources in the Argos frequency band and downlink the measured signals via a "pseudo-message" feature.

Using this technique a discrete noise source has been located near an airport in Algeria (see map below). An additional noise source has been located in Italy but the specific location is currently uncertain. The specific impact of these noise sources on Argos transmissions is also unknown. Consequently these measurements are still under way.

Summary

The CLS approach to addressing problems of potential "interference" in the European Region and elsewhere is both technical and administrative. On the technical side, in addition to the investigations described above, CLS has also developed some analytical tools that are now available to help Argos users optimize their PTT communications through careful selection of parameters such as transmission frequency, output power and, transmission protocol as a function of the deployment area. Since the performance of the Argos System depends on many parameters, it is recommended that you contact CLS to discuss your specific requirements and take advantage of the new tools to help define optimum transmission strategies.

Raw estimate of the location of a noise source in Algeria, close to Hassi Messaoud.

Administratively, CLS has started actions via their parent organization, CNES, the French Space Agency, to resolve specific sources of interfering noise already identified and documented.

MTI's Comments:

We are pleased to see that the map we plotted from observed performance of PTTs in Europe fits remarkably well with the data from the satellites. The area most affected falls between the two observed sources of interference. Unfortunately until new advances in battery technology are made, the power output of bird-borne PTTs will be limited by the need to keep the devices lightweight and transmitting long enough for a meaningful study. We can presently increase the power output of our PTTs; however, this must be traded against battery life and/or weight. Ultimately, improvement in Argos performance in Europe will probably only come about by you, the world's scientists, pressuring the authorities in Europe (CEPT, ERO and the ITU in Geneva) to enforce the international agreed band plan.