

N4KG on SR/SS Enhancement and Grayline Propagation

There are TWO effects which take place at sunrise and sunset.

GRAYLINE effects refer to locations along the terminator, encircling the globe along a great circle route. The GRAYLINE provides a low loss path of varying width and duration depending on frequency. On 160 and 80 meters, these openings may last only a few minutes (and are NEVER shown on computer predictions to my knowledge). At the other end of the spectrum, there are also LP openings along the terminator on 10, 12, and 15 meters.

SUNRISE ENHANCEMENT accounts for the peak associated with signals coming from the westerly directions, NOT on the GRAYLINE but often mistakenly referred to as grayline. This appears to be a focusing effect resulting from refractions from the normal F layer propagation plus another refraction from the E-layer which combine to produce significant gains (on the order of 6 to 10 dB, sometimes even more) ranging from a few minutes on 160 meters, 10 to 20 minutes on 80 meters, and 30 to 60 minutes on 40 meters. These enhancements always occur AFTER sunrise on 40 and 80 meters and tend to occur at sunrise +/- a few minutes on 160 meters.

SUNSET ENHANCEMENT accounts for the peak associated with signals coming from the easterly directions, NOT on the GRAYLINE. Again, this appears to be a combined F and E layer condition, occurring BEFORE sunset with durations similar to those of the above mentioned SUNRISE enhancement.

It is my OPINION that most computerized propagation programs DO NOT account for the SUNRISE and SUNSET effects on the LOW BANDS, which REQUIRE the presence of daylight at one end of the path to produce the signal enhancement. I recall years ago there was a propagation column in Ham Radio Magazine in which the author ALWAYS indicated that signals on the low bands peaked BEFORE SUNRISE (NOT !) which told me he had never listened to the low bands during his pre and post sunrise times!

On 80 and 40 meters, signals ALWAYS peak AFTER SUNRISE to the west and BEFORE SUNSET to the EAST. On 160M, signals can peak at sunrise and sunset and can also peak during darkness. 160M is the LEAST predictable band in the amateur spectrum.

To my mind, most computer propagation programs are USELESS for predicting optimum times for LOW BAND propagation, especially the Sunrise and Sunset enhancements. One recent SE Asia DXpedition utilized such programs and regularly appeared on low bands between 10 and 12 GMT, BEFORE USA sunrise, and predictably worked few eastern USA stations, promptly leaving the low bands at east coast sunrise when their neighbours in DU, HS, 9M2 appeared with good signals into the eastern USA between 12 and 13 GMT. (Just because someone is a good operator, experienced DXpeditioner, and uses computer propagation predictions does NOT mean they will be productive LOW BAND providers on the difficult POLAR PATHS. Dedication and experience is required. The BEST example is the German team from VK9CR, VK9XY, S21XX, ZL7DK, P29VXX.)

Again, in my OPINION, most computer propagation programs UNDERESTIMATE MUF by a significant percentage. IONCAP will often predict the MUF to Europe to be just above 21 MHz and yet we find 12 and even 10 meter openings. These predictions are useful for indicating peak TIMES on the HIGH BANDS and when the HIGH BANDS will open and close (i.e. they pretty well know when the sun comes up and goes down) and their MUF numbers at least track actual MUF even if they are not very accurate. As you can tell, I am not a big fan of computer predictions.

The BEST tools for the serious LOW BAND DXer include a good mapping program (The DX EDGE, GEOCLOCK, MiniProp by W6EL, etc.) and/or accurate tables indicating SUNRISE and SUNSET. It should be noted that the definition of SUNSET and SUNRISE is when the CENTER of the sun is at the horizon (NOT first light or last light).

Remember, it takes a little LIGHT for the low band enhancements to materialize!

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