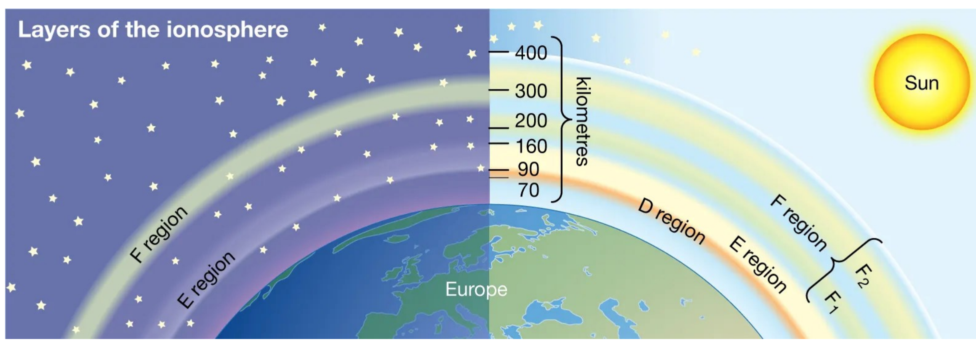
Strays – Sunspots

Every so often, we hear of one ham or another mentioning **sunspots**. What's so important about them that their reports are announced on nets, websites, and social media? I mean, you've likely been doing ham radio successfully for years without a care about sunspots.

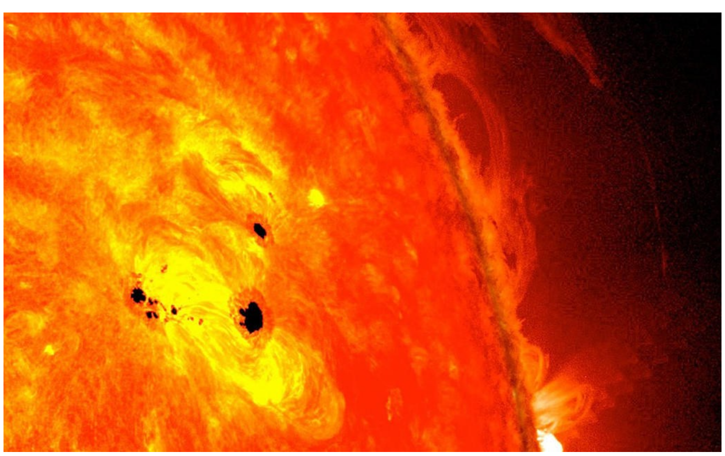
Sunspots are large vent holes on the Sun's surface, through which hot plasma is released in huge quantities. They're so bright that you can't look at them with your unaided eye, but appear dark in photographs because of the heavy filtering. They're darker than their surroundings because their temperature is lower than that of the surrounding photosphere.

Sunspots also release huge quantities of UV (ultraviolet) radiation, some of which reach Earth. When the UV rays strike our atmosphere, they ionize the nitrogen (N_2) molecules into N_2^+ ions and electrons, forming an electrified spherical cloud called the ***ionosphere*** around the Earth. This atmospheric shell acts like the inside of a metallic reflecting bowl, off which radio waves can bounce, reaching far from the originating location, also known as *skip propagation*.



Eventually, the N_2^+ and e^- pair recombines, so new ions must be created constantly to sustain a reflective dome overhead. The more sunspots there are, the more UV radiation can reach Earth; and more UV radiation to the Earth means a stronger ionosphere. This is why hams keep track of sunspot activity. It's like keeping an eye on the Hawaiian surf, so you can know when to grab your board and shoot the curl.

In spite of the great benefit that sunspots provide the amateur radio world, there is a downside. More sunspots can mean more solar flares, which can send increased amounts of charged particles to Earth in the solar wind, resulting in geomagnetic storms that can disrupt skip propagation.



Each sunspot has a lifetime of a few hours to a few days. Furthermore, some years the Sun produces more sunspots than in other years; in fact, the production of sunspots reaches a maximum approximately every eleven years, which we call the ***sunspot cycle***.

During the daytime, lower-frequency signals, like those of 80 meters and 40 meters, do not possess the inherent ($E = hf$) energy to penetrate the ionospheric D layer, which is closer to the Earth's surface, and so are absorbed by that layer. 10-meter and 6-meter signals, on the other hand, do have sufficient inherent energy to penetrate the D layer, and will proceed to reach and bounce off the F2 layer, if the F2 layer is enhanced enough. And that enhancement can occur with a large outpouring of UV radiation, as a result of increased numbers of sunspots, in combination with the normal UV presented by the daytime Sun, allowing for worldwide propagation.