NOAA JETSTREAM MAX - THE IONOSPHERE

http://www.srh.noaa.gov/srh/jetstream/atmos/ionosphere_max.htm

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This absorption of radiation is also responsible for the Ionosphere. Located within the thermosphere, the ionosphere is made of electrically charged gas particles (ionized). The ionosphere extends from 37 to 190 miles (60-300 km) above the earth's surface. It is divided into three regions or layers; the F-Region, E-Layer and D-layer. During the daytime the F-Layer splits into two layers then recombines at night.

The E-layer was discovered first. In 1901, Guglielmo Marconi transmitted a signal between Europe and North America and showed that it had to bounce off an electrically conducting layer about 62 miles (100 km) altitude. In 1927, Sir Edward Appleton named that conducting layer the (E)lectrical-Layer. Additional conducting layers discovered later were simply called the D-layer and F-Layer.

Since the ionosphere's existence is due to radiation from the sun striking the atmosphere, it changes in density from daytime to nighttime. All three layers are more dense during the daytime. At night, all layers decrease in density with the D-Layer undergoing the greatest change. At night the D-Layer essentially disappears.

As seen around the 1900's, the ionosphere has the important quality of bouncing radio signals transmitted from the earth. Its existence is why places all over the world can be reached via radio.

As the radio signal is transmitted, some of the signal will escape the earth through the ionosphere (green arrow). The ground wave (purple arrow) is the direct signal we hear on a normal basis. This wave weakens quickly and is what one hears as a fading signal.

The remaining waves (red and blue arrows) are called "skywaves." These waves bounce off the ionosphere and can bounce for many 1000's of miles depending upon the atmospheric conditions.