lines, at or very near the speed of light. An observer on a hill, a camera in an aircraft, or a television in a satellite has a "field of view", but this cannot extend beyond a horizon determined by the location of the sensor. The horizon as seen by an observer close to ground level is likely to be dominated by buildings, trees, or hills. But from higher altitudes the line of sight will extend as far as a horizon that is determined by the curvature of the earth, modified slightly by downward refraction of radiation when travelling nearly horizontally in the lower atmosphere.

For an aircraft 10,000 metres above the sea, the distance to the horizon will be beyond 350 km. From an altitude of 300 km above the sea, a satellite's horizon is nearly 2000 km away.[19] In practice, electromagnetic energy travelling nearly horizontally for long distances through the lower atmosphere suffers attenuation and scattering as well as refraction, so that useful observation of objects at zero or low altitude is unlikely when the rays graze the surface of the earth at angles of less than 3°. Figure 4 shows the cones useful for sensor operation, striking earth at grazing angles of 3°, as subtended by satellites orbiting at heights of 325, 807, and 1500 km. The powerful effect of altitude on a satellite's field of view is very evident.

The wavelengths used by infrared and radar devices are longer that those of visible light, and are subject to more complicated processes of absorption and scattering. However, for infrared as for visible light, it can be said that radiation which is not absorbed or scattered will be propagated in nearly straight lines, and is therefore cut off by the horizon. The same is true for the majority of radars and, as for visible light, returns will probably not be useful for grazing angles of less than 3°. However there is an important exception for high-powered radars using wavelengths in the HF (High Frequency) band. At these wavelengths certain layers of the ionosphere (located 50 to 400 kilometres above the earth) reflect radiation forward and downwards, allowing it to

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[19] The horizon is determined by the curvature of the earth, and the curvature of the path of the radiation. However, it will usually be impossible to extend surveillance as far as the horizon from satellite altitudes.