



**A History of RFI Protection of Radio Astronomy and
the Latest Threats**

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Radio Astronomy was born in 1931, out of K.G. Jansky's effort to identify the origin of interference to transatlantic short-wave communications. The science progressed rapidly after the end of World War II, particularly following the detection of the HI line by Ewen and Purcell, in 1950. Efforts to protect radio astronomy observatories from radio frequency interference (RFI) commenced shortly after these developments.

At first, protection efforts were directed to limiting interference due to fixed and mobile transmitters, operating at frequencies of up to a few hundred MHz. With the advent of artificial satellites, protection efforts began to be directed at geostationary satellites, that blocked access to the sky at some frequencies in a belt centered on the geostationary orbit. After the launch of the first GLONASS satellites, RFI protection of radio observatories shifted increasingly towards limiting the impact of non-geostationary satellite systems, particularly those larger systems that blocked access to the radio sky at all, or most of the time, at frequencies of interest to astronomers, e.g. the OH lines near 1610 and 1660 MHz or the redshifted HI line, below 1400 MHz. Technological progress, stimulated in part by the need of satellites to operate in the most transparent portion of the atmosphere, made radio observations vulnerable at frequencies up to ~ 20 GHz.

During the last two decades mass market devices, that require only type licensing and that can be easily carried everywhere, became the new threat to radio astronomy. One example of this type of device are the variety of vehicular radars being now installed on most cars. Once again, this development was simultaneous with the march of radio technology towards higher frequencies; vehicular radars operate at ~ 76 GHz and it is expected that such unlicensed devices will be operating soon at even higher frequencies. Still more recently, proposals have been made to provide internet and related services by satellite systems that are comprised by hundreds or even thousands of satellites. Such systems would, in all likelihood, make the sky inaccessible not only in portions of the radio spectrum but would interfere with optical observations as well.

I describe these distinct periods of RFI protection efforts, with particular emphasis on the latest threats.