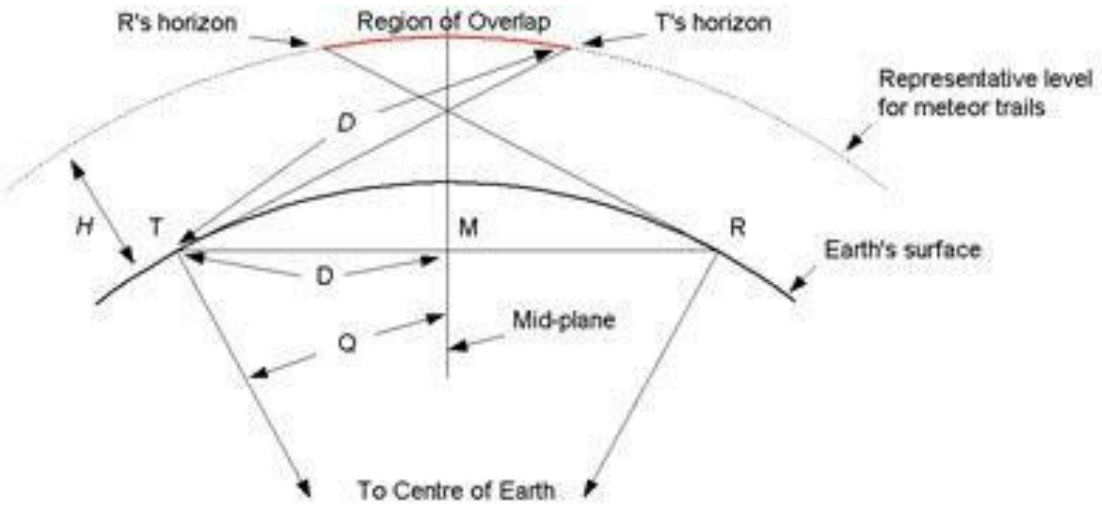
Background

Radio meteor detection is a popular introduction to radio astronomy. With relatively simple equipment, it is possible to detect meteors.

Amateur astronomers typically use the forward scatter method. This is where the transmitter and receiver are in separate locations. The signal is then scattered forward to the receiver from a meteor somewhere between the two, as shown in the diagram below:



Based in the UK, we are fortunate to have a space-radar station at GRAVES, located just outside Dijon, France, which is ideally placed about 700km from central UK. This broadcasts at a frequency of 143.050Mhz.

The system was designed to detect space objects in a wide arc, from due East through South to due West at elevation angles from 15° to 40°. Advantage is taken of this powerful transmitter for radio meteor detection and events can be detected from radio observers across Europe. These meteor captures can be made for observers up to the radio horizon of meteor altitudes in the main (southern) beam. Many radio observers to the north of the Dijon line - indeed, some as far as the Scottish islands detect very reasonable numbers of meteor events.

GRAVES has a rotating beam and, consequently, depending upon the location of the RX station, it’s quite possible that an event may be captured by one station and another may not record it. Additionally, there are other factors about GRAVES which are not known and, again, this contributes to the limited science that may be undertaken using this TX source.

UK Beacon Project

Looking forward

The Radio Astronomy Group (RAG), which is part of the British Astronomical Association (BAA) and supported by the Radio Society of Great Britain (RSGB) and The Mansfield and Sutton Astronomical Society, are running a project to have our own dedicated UK-based beacon and receiver network. This will facilitate the study of meteors over the UK.

In addition to enabling existing amateur radio astronomers to participate in this interesting citizen science, schools and colleges will have access to the beacon either directly or via web-based receivers in support of STEM education.

Some technical information

The transmitter will beam vertically upwards using circular polarisation with an inclusive beam width of 120 degrees. This will illuminate an area with a radius of about 200km above the beacon at the altitude of 100km where ionization trails occur as meteors entering the earth's atmosphere burn up. These trails reflect the radio signal and the "echoes" can be observed by day and night, largely independent of weather conditions. The beacon will feature precise frequency control to facilitate accurate Doppler measurements.

A network of web-based receivers featuring precision timing and streaming their data to a central repository for analysis and storage is also proposed.

For more information, please visit: ukbeacon.m81.co.uk