Comparison of frequency (HRO/VOR-RO) and detection number in meteor radio wave observation

*Sora Endo[1], *Rio Saito[1], *Aki Sato[1], *Sachi Sato[1], *Sakura Yuki[1]

1. Furukawareimei Junior High School / High School

We, Miyagi Furukawa Reimei Junior and Senior High School Astronomical Group, have been conducting research on astronomy, but "astronomical observation" is an absolutely essential activity in astronomy research. However, they usually use large telescopes or CCD cameras for such observations, requiring them to move to specialized facilities. Also, it is mainly a nighttime activity and cannot be done during school club activities. Furthermore, even if these problems can be solved, the effects of the weather are large and it is not possible to observe them reliably. Here, we tried radio wave observation of meteors using amateur radio waves that can be observed and analyzed in rainy or cloudy weather, indoors, day or night.

When a meteor appears, ionized gas (plasma) is generated along the path of the meteor. This gas becomes a reflector of the radio wave, and usually receives the radio wave from the transmitting station temporarily in an observation place where the radio wave from the transmitting station does not reach. This is a meteor observation method using this principle. HRO (Ham-band Radio Observation) is a method of observing meteor radio waves, and is currently widely practiced in Japan from high school students to professionals. Mr. Kimio Maekawa is transmitting radio waves around the clock. The place of origin is Fukui Prefectural University. An ultra-high frequency omnidirectional radio beacon is an aircraft radio beacon that uses VOF band (ultra-high frequency band) radio waves. It knows the direction of an aircraft around a beacon. Can be. The origins are almost all airports throughout Japan. This time, we compared the difference in the number of meteor detections by frequency using two types of radio waves with different frequencies of Fukui HRO (53.755MHz) and Komatsu Airport VOR-RO (112.00MHz). Note that the geographical conditions of the transmitting station and the conditions such as directions from the Reimei Furukawa Junior High School and High School in Miyagi Prefecture, which are the receiving places of radio waves, are almost the same.

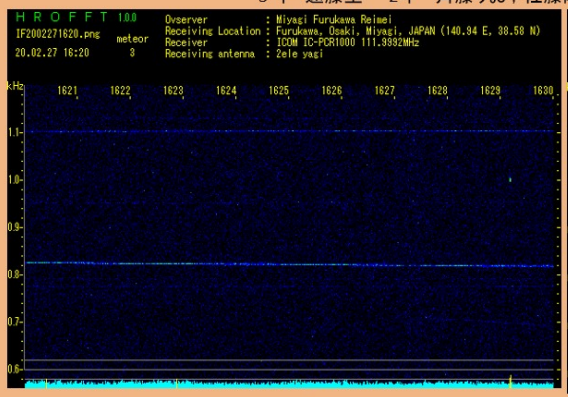
Next, the observation results. Even if meteors were detected on the VOR-RO observation screen, only the noise, which is not necessary for observation, was observed on the HRO observation screen, and meteors could not be detected. In addition, lightning noise was observed in the HRO, and meteors were sometimes not detected. When the Taurus meteor shower, which reached its maximum in November 2019, was counted, VOR-RO detected more meteors than HRO near the maximum day. In addition, when the data was collected from March 10 to March 20 in 2020, VOR-RO detected more meteors than HRO. Comparing from May to December 2019 by month, VOR-RO detected more meteors than HRO from May to June. However, from August to December, HRO detected more meteors than VOR-RO.
Finally, considerations and future issues. From May to July, the number of detected HROs less than the number of VOR-ROs may be due to the influence of noise such as the Sporadic E layer. It is considered that the number of HRO detections decreased due to the influence, and VOR-RO is less likely to be affected by noise. Especially in June, we were able to reduce the effect of noise by about 45% compared to HRO. From the above, it was found that the detection accuracy differs depending on the season. Observations will continue in the future, and from the observation results throughout the year, there will be a difference in the maximum detection accuracy as to how much the VOR-RO (112.00MHz) and HRO (57.755MHz) will be affected by noise in each season. I would like to investigate further.

Keywords: meteor

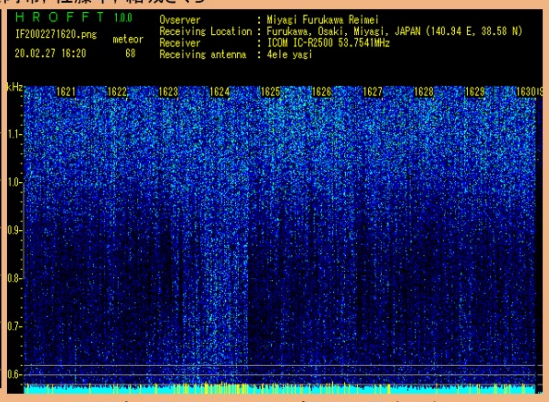
流星電波観測における周波数（HRO・VOR-RO）と検知数の比較

宮城県古川黎明中学校　自然科学部　天文班

3年　遠藤空　2年　齊藤りお，佐藤阿希，佐藤幸，結城さくら



2020年2月27日16:20の観測画面(VOR-RO)



2020年2月27日16:20の観測画面(HRO)

観測画面