

## **Establishment and operation test of real-time data analysis method for a new 5ch-HRO interferometer and comprehensive meteor observation with video cameras and infrasound sensors**

Takumi Sato<sup>1</sup>, SeiyaTakeda<sup>2</sup>, and Masa-yuki Yamamoto<sup>1</sup>

<sup>1</sup> Kochi University of Technology, 185 Miyanokuchi, Tosayamada, Kami, Kochi, 782-8502 Japan

<sup>2</sup> Bascule Co. Ltd., Shiroyama Trust Tower 2F, 4-3-1 Toranomom, Minato-ku, Tokyo, 105-6002 Japan

In Kochi University of Technology (KUT), we have been conducted Ham-band Radio meteor Observation (HRO) system with using amateur radio communication of 50 MHz (6-meter) band as the method of forward-scattering radio meteor observation since 2003 and opened up a useful meteor investigation tool as a successive research theme for students. Until April 2019, based on our previous trails in the 5-channel (5ch) HRO interferometer, we developed a new HRO interferometric receiver with cutting-edge circuit technologies and made successful operation of the HRO interferometer system. Furthermore, we recently developed a comprehensive type infrasound sensor with a company and deployed 15 sensors in Kochi prefecture in Shikoku-island in Japan, then a comprehensive meteor observation was constructed in comparison with optical video observations.

In the new system, we tried to obtain more precise datasets by making the 5ch-HRO system to the new one with changing its down-converted frequency to be from 900 Hz to 4 kHz through the super-heterodyne circuit with a combination of 5 antennas, so as to realize automatic meteor echo detection by applying new processing method for getting meteor data in real time. In order to obtain precise intrinsic phase shift in the new receiver circuits, we used comprehensive meteor observation, and tried to detect simultaneous meteor observation with the three different methods. From August 2018 to February 2019, we operated the comprehensive meteor observation in KUT. In January 2019, we tried to determine the intrinsic phase shift for the new 5ch-HRO and three candidates were calculated, but we have not confirmed it yet in Quadrantids season. Due to lack of the observation data, the intrinsic phase shift might not be confirmed correctly, thus we will continue to operate the new system after checking the analyzing process so as to obtain more obvious simultaneously observed datasets for establishing the intrinsic phase shift and ensure the accuracy and reliability of the observation method.

Also, in January 3, 2019, we got a data of the same fireball data by optical and infrasonic observations. It could be the first case of simultaneous detection of a fireball both of video and multiple-site infrasound observations in Japan.

Here, we applied the new trial of real time analyzing to KUT 5ch-HRO with confirming the validity of the new receiver system, and obtained the candidate values of the intrinsic phase shift necessary for our future research, as well as establishing regional infrasound detection network with 15 sensors in about 100 km aperture. We shared a part of accurately obtained data on the web and some mailing lists, so as to contribute to the development of meteor science.