In-orbit Stability Evaluation of the AOS (Acousto-Optical Spectrometer) of Superconducting Submillimeter-Wave Limb-Emission Sounder (JEM/SMILES)

S. Mizobuchi[1*], K. Kikuchi[2], S. Ochiai[2], T. Nishibori[1], and H. Ozeki[3]
1 Japan Aerospace Exploration Agency, Tsukuba, Ibaraki, 305-8505, Japan*
2 National Institute of Information and Communications Technology, Koganei, Tokyo, 184-8795, Japan
3 Toho University, Funabashi, Chiba, 274-8510, Japan
* Contact: mizobuchi.satoko@jaxa.jp

***Abstract*—The Superconducting Submillimeter-Wave Limb-Emission Sounder (SMILES) had observed submillimeter-wave radiation from atmospheric minor constituents for having a better understanding of mechanism controlling the stratospheric ozone amounts and those relating to climate change. The SMILES has been attached to the Japanese Experiment Module (JEM) on the International Space Station (ISS). The observation was started in October 2009, and had been performed for more than a half year.**

We adopted two sets of Acousto-Optical Spectrometer (AOS) for detecting submillimeter-wave radiation signal as spectral image. For giving the best performance on the data retrieval, the instrumental function should be determined as precisely as possible. One of the most sensitive instrumental functions is the response function which characterized the response against the input signal of the AOS. However, we found a systematic discrepancy among SMILES data products, some of which may be attributed to insufficient modeling of the response function.

Usually, several kinds of measurements and analysis are conducted within prelaunch activities in order to understand the detailed characteristic of each instrument. That is because these checks sometimes require dedicated equipments or tools that cannot be brought due to the limits of available resources, and it is not easy to know the each instrument behavior after combining all instruments as one detector. On the other hands, instrument performance can be changed because of launch impacts, the in-orbit actual performance can be different from the one at ground, and the performance can change with time. Therefore, it would be advantageous to have an alternative way to characterize the instrument function in orbit.

SMILES have the way to calibrate the function by using comb signals that are originally used for the frequency calibration of the spectrometer. Using in-orbit calibration data, we tried to check stability of parameters which characterize the instrument function of AOS. In this presentation, these results are discussed and reported.