R009-33
B 会場 ：11/7　PM1 （13:45-15:30）
15:15〜15:30

#田口　真 [1)], 荘司　泰弘 [2)], 中野　壽彦 [3)], 今井　正尭 [4)], 佐藤　光輝 [5)], 高橋　幸弘 [5)], 高木　聖子 [5)], 濱本　昂 [5)], 大野　辰遼 [5)], 田中　響子 [1)], 西出　太郎 [2)], 川筋　直樹 [2)], 河野　大輔 [1)]
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Spectroscopic and imaging observation of Venus for identification of an unknown absorber by a balloon-borne telescope FUJIN-2

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Gaseous species that absorb solar light in the wavelength region of 280 – 500 nm exist in the Venusian atmosphere. It has been known that SO2 absorbs light with wavelengths shorter than 320 nm, whereas it has not yet been identified what gas species are responsible for absorption with wavelength longer than 320 nm. A recent study suggests S2O and OSSO are the most plausible candidates as the unknown absorber [Perez-Hoyos et al., 2018].

A balloon-borne stratospheric telescope FUJIN-2 will obtain near-ultraviolet to visible spectra and images of Venus to identify the unknown absorber. From the upper stratosphere at an altitude of ˜32 km where absorption by the ozone layer is much weaker than the ground level Venus reflection spectra down to 290 nm can be measured. The reason why the unknown absorber has not been identified for a long time is that the spectral resolution of the past spectral observations of Venus was too low to resolve the characteristic absorption features by gaseous species. FUJIN-2 enables us to observe Venus in the near ultraviolet region where observation is impossible from the ground, with a high spectral resolution at a far low cost compared with an orbiter or a satellite telescope.

The gondola is 3.5 m high and weighs 1.23 t including the weight of ballast of 550 kg. The spectrometer onboard FUJIN-2 covers a spectral range of 200 – 550 nm with a spectral resolution of ˜0.5 nm, which is high enough to resolve characteristic absorption features by the candidate molecules. A Cassegrain telescope with a clear aperture of 400 mm is mounted on the gondola, of which attitude is stabilized with respect to the inertial space by an active decoupling mechanism and control moment gyros. Geomagnetic sensors and GPS are used to determine attitude and position of the gondola. A target object is found by wide and narrow star sensors and tracked by the telescope mount so that the object is always at the center of field-of-view of the telescope. Guiding error is detected by a position sensitive PMT and corrected by a tip/tilt mirror (TTM) installed between the secondary mirror and the main focus in real time. A power supply unit with Li-ion batteries, onboard computers, a power supply for TTM, and an Iridium satellite communication receiver/transmitter are installed in a pressurized chamber in which temperature and pressure are kept at a room condition.

The balloon experiment will be conducted in Alice Springs in Australia in March/April, 2023. An image of Venus at the wavelength of 365 nm where the absorption contrast is the highest in the near ultraviolet and visible regions will be acquired to distinguish dark and bright regions seen in the ultraviolet. During 4 hours of the expected level flight duration spectra and images at low, middle and high latitudes of Venus will be obtained. From the spectra obtained by the experiment the unknown absorber will be identified, and a solar heating rate in the cloud layer will be estimated with a chemical dynamical atmospheric model.