Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

PEM07-37 会場:302 時間:5 月 26 日 10:15-10:30

宇宙線による新粒子生成促進についての重イオンビームでの検証実験
Laboratory experiment with heavy ion beam for verification of new particle formation by cosmic rays

鈴木 麻未 [1*] ; 増田 公明 [1] ; 伊藤 好孝 [1] ; さこ 隆志 [1] ; 松見 豊 [1] ; 中山 智喜 [1] ; 上田 紗也子 [1] ; 三浦 和彦 [2] ; 草野 完也 [1]
SUZUKI, Asami[1*] ; MASUDA, Kimiaki[1] ; ITOW, Yoshitaka[1] ; SAKO, Takashi[1] ; MATSUMI, Yutaka[1] ; NAKAYAMA, Tomoki[1] ; UEDA, Sayako[1] ; MIURA, Kazuhiko[2] ; KUSANO, Kanya[1]

[1] 名古屋大学太陽地球環境研究所, [2] 東京理科大学
[1]Solar-Terrestrial Environment Laboratory,Nagoya University, [2]Tokyo university of science

It is considered that the solar activity may affect the global climate, but the correlation mechanism is still not understood. One of the possible mechanisms for the correlation is the cloud formation by the galactic cosmic rays, which are modulated by the variation of solar magnetic activity. This relation was clearly indicated by the good correlation observed for the galactic cosmic-ray intensity and the global low-cloud amount. This hypothesis includes the ion-induced nucleation model, in which new particles in the atmosphere are created efficiently through atmospheric ions produced by cosmic rays, and finally these particles grow up to the size of cloud condensation nuclei. In this study, a laboratory experiment for verification of the hypothesis has been conducted with a reaction chamber. A flow of clean air with water vapor, ozone and sulfuric dioxide was introduced to a metallic chamber, where we irradiated UV light for solar irradiance and beta rays or accelerator beam for cosmic rays. The beam of the heavy ion accelerator HIMAC at National Institute of Radiological Sciences was used in the present experiment.

The result so far showed that ion density in the chamber increased due to the heavy ion irradiation and enhancement of the number of aerosol particles due to its was confirmed. In this presentation, I will report the results of the heavy ion irradiation experiments. Heavy ion beam of nitrogen and xenon was used because their ionization loss is different by a factor of 60. The ionization loss could be an index representing the ability to ionize the air molecules that is, parameters that contribute to atmospheric ion generation. Since it is considered that the aerosol particle generation would be increased according to the amount of ions, the experiment was carried out for these ions. The results showed that produced ion density was not different for both ions with different ionization power, and aerosol particle production efficiency was almost the same. The less ionization density for Xe ions might be due to large recombination of produced ions along the ion beam tracks.