

Distribution of tailing minerals deduced from remote sensing data in Bor mining area, east Serbia

*Stefan Djordjievski¹, Sachi Wakasa², Vladan Marinkovic¹, Kazuyo Hirose³, Ljubisa Obradovic¹

1.MMI Bor, 2.Akita Univ., 3.JSS

City of Bor is located in east part of Republic of Serbia. The exploitation of copper ore has been operated since 1903. Main types of the copper ore in Bor ore deposits are massive sulfide copper deposits, vein and stockwork-disseminated type of mineralization, porphyry mineralization, and reworked ore-clasts of copper sulfides. Underground mining and open pit mining carry out exploitations of ore. In the five-year-period, between 2010 and 2014, Mining and Smelting Combine Bor produced 155 thousand tons of copper, 24 tons of silver, and 4.5 tons of gold. Mining activities have produced large amount of waste materials. Until now, it has been disposed 450 million tons of overburden, 207 million tons of flotation tailings and 23 million tons of slag. Pyrite from the tailings is exposed to water and oxygen, which leads oxidation of this mineral and production of acid mine drainage. Releasing untreated acid mine drainage and wastewater from smelter into a river is a reason of serious environmental pollution. Fine-grained flotation tailings transported by winds and river water become air and soil pollutions and river sediment. In order to make comprehensive environmental evaluation and propose reclamation system, collaboration between Japan and Serbia has been started in 2015. This project is supported by SATREPS from JICA and JST. The project will be continued until 2020. This project has two main research groups; environmental evaluation group, and detoxification and resources recovery group.

Environmental evaluation group studied about distribution of tailings and wastewater deduced from satellite image data analyses. In 2015, the group members researched about tailing distribution by using satellite images. First, tailing positions were extracted from ASTER and LANDSAT images. Because spectrum of the tailing had decay slopes in Band 3 images in both of ASTER and LANDSAT, the tailing areas were identified from ratio between Band 2 and Band 3 of these images. ASTER and LANDSAT images were not able to distinguish between soil and tailing because of their wide Band ranges. Therefore, the members distinguished tailings from seasonal changes of spectrum in these areas. The seasonal change was caused by vegetation. Next, 22 samples of surface materials were took and observed. Almost surface materials matched satellite analysis results, but a few areas were different from the satellite analysis results. These 22 samples were analyzed spectrum by a spectrometer and determined mineral by XRD. These spectrum data were compared with satellite images. In addition, high-resolution images (World View 2) were purchased and analyzed with other images and data. Especially, Vrazogrnac plane where was confluence of Bor and Timok Rivers. Timok River connects to Danube River.

Environmental evaluation group would reveal from material content with depth in future drilling works. Spectrum data was correlated with XRD data. XRD result showed that tailing samples were including Jarosite, Kaorinite, Illite, and Gypsum. Vrazogrnac area was measured secular change and collected samples. There were also compared with spectrum data. High resolution images around there were also measured the areas in details.

These tailings would be transported to Danube River, the international river, then they could make around countries environmental influences. Our study would resolve the problems by continuing our observation about distribution of tailings. In order to research in details, we should prepare hyper spectrum images. Acquirement of images from Hyperspectral and/or LCTF-UAV would resolve these problems in the future.

Keywords: remote sensing, mining, tailings, pollution, Bor

Importance of the examination of hygiene in space foods

*Chie Yonezu¹, Naomi Katayama¹

1.Nagoya Women's University

The microbe management in the closed room space is very important. Microbe propagates by temperature and the humidity. The prevention of the food poisoning in particular is very important. We obtained data in MDRS (closedown space facilities) which association of American Mars had in Arizona. We thought about the microbe management area in the spaceship by using provided data form MDRS examination. The hygiene management of the case about the meal, about cooking operation and about a place which put the delicatessen are necessary. It is necessary to manage the spatter of the food. It is effective to kill microbe by using alcohol sterilization or sodium hypochlorite sterilization. The hygiene management in a restroom and the shower is important, too. The microbe propagates by moisture. The water wiping is important. In addition, the hygiene management in bed-clothing and clothes is necessary. It is necessary to strengthen hygiene management when I injure a finger. This is because staphylococcus aureus may propagate.

Keywords: Space foods, Examination of microbe, Hygiene management

The use of the disaster food as space foods -Sensuality evaluation of the taste-

*Yuka Ishikawa¹, Naomi Katayama¹

1.nagoya womans univercity

We think that it is performed in future to use disaster food to space foods. We think that it is performed in future to use disaster food to space foods. The space foods and disaster foods are can store at normal temperature for a long term. However, the commercially available disaster food does various meal forms. The mainstream is freeze dry. However, there is the retort-packed food, too. There are the disaster foods which are preservation in sugar and/or in salt. But, if both the space foods and the disaster foods are not delicious, we could not eat it continuously. We need delicious foods and rich nourishment foods are necessary. Therefore this study built menus by using commercially available disaster meals. We ate our menus food. After having eaten disaster foods, I evaluated the taste. After that, we made a new menu by using high evaluation foods again.

Keywords: Space foods, Disaster food, Marketing product, Sensuality examination

The use of the disaster food as space foods

-Salt density investigation-

*Naomi Katayama¹

1.Nagoya Women's University

It is necessary to check glucide and salinity to use disaster food to space foods. The hyperglycosemia after a meal causes diabetes. Because quantity of muscle decreases in the space, basal metabolism comes off. Therefore attention is necessary for a glucide intake. Similarly, attention is necessary for an intake of the salinity. This is because it is necessary to prevent edema. Therefore this study checked salinity included in the commercially available disaster food. We thought about the menu which was less than 10 g in a daily salt intake. We made the menu which included minimized glucide. We calculated about vitamins and the mineral. After all we thought that the insufficient nutrient had to take it with a supplement.

Keywords: Space foods, Disaster food, Marketing product, Salt content