

## High resolution ground penetrating radar (HGPR) for exploration of the subsurface ices in the lunar polar region

\*Atsushi Kumamoto<sup>1</sup>, Hideaki Miyamoto<sup>2</sup>, Toshiyuki Nishibori<sup>3</sup>, Fuminori Tsuchiya<sup>1</sup>, Takahiro Iwata<sup>3</sup>, Ken Ishiyama<sup>3</sup>, Mitsunori Ozaki<sup>4</sup>, Makiko Ohtake<sup>3</sup>

1. Tohoku University, 2. University of Tokyo, 3. JAXA, 4. Kanazawa University

Design of high resolution ground penetrating radar (HGPR) for exploration of the subsurface ices in the lunar polar region has been investigated.

Presence of the ice in the lunar polar region has been long discussed in many studies [Watson et al., 1961; Arnold 1979; Feldman et al., 1998; Haruyama et al., 2008; Colaprete et al., 2010; Spudis et al., 2013]. Although we have no information on the depth, size, and abundance of the ice below the surface if it exists, we propose a high resolution ground penetrating radar onboard the rover with operation frequency of 1-15 GHz to detect the ice up to depth of 3 m at a resolution of 1 cm, which could be utilized as resources in the near future.

The porosity scale height below the lunar surface was estimated to be 6.5 km [Binder and Lange, 1980]. With assuming a regolith model in which pores are not filled by ice and partly filled by ice, the permittivity contrast between the regolith with ice and without ice are estimated to be enough detectable by the HGPR.

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