

## **Development of a Compact MRI System in Cold Room for Imaging of Structure of Snow and Ice**

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We have developed a compact MRI (Magnetic Resonance Imaging) system for visualizing the three-dimensional microstructure of snow and ice by using a high-field-strength (1.04 T) permanent magnet in a cold room (-5 °C). In general, an MRI system uses a superconducting magnet; however, it cannot be used in a cold room because it is considerably large and requires a low-temperature cryogen (liquid nitro and liquid helium). The proposed MRI system consists of a portable MRI console and an extremely compact permanent magnet. A portable MRI console is set up at room temperature beside the cold room. A three-dimensional driven equilibrium spin-echo sequence and dual scan was used for the three-dimensional high-resolution imaging (image matrix = 256<sup>3</sup>; voxel size = ((123 μm)<sup>3</sup>; total imaging time = 2-16 h; and number of excitations = 1-8). Because the MRI signal from the ice is very weak in the MRI system, the air gaps in the snow and ice are filled with dodecane (C<sub>12</sub>H<sub>26</sub>), and the filler is imaged. This compact MRI system is a powerful tool to visualize the microstructure of snow and ice in a cold room.