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First Onsite Activities at Dome Fuji II for 30-cm Sub-millimeter Telescope Installation

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Dome Fuji II is located at an altitude of approximately 3,810 m in inland Antarctica, one of the best sites on Earth for sub-millimeter astronomical observations, owing to its extremely low atmospheric water vapor content and cold temperatures. The Consortium of Antarctic Astronomy of Japan is developing a 30-cm sub-millimeter telescope for deployment at Dome Fuji II. In the receiver, the two double-sideband superconductor-insulator-superconductor (SIS) mixers are coupled to a corrugated horn with RF/IF hybrids. The simultaneous survey observations of the two molecular emission lines, CO($J = 4-3$) and [CI]($^3P_1-^3P_0$), are achieved in the 500-GHz band. The receiver system and telescope are progressing in preparation for upcoming transportation towards Antarctica this year by evaluating the performance measurements in a cold environment around -20 to -30°C . From October 2024 to February 2025, two people joined the 66th Japanese Antarctic Research Expedition (JARE-66) to carry out site preparation and infrastructure development for telescope operation at Dome Fuji II, as the first visit from our team. To mitigate the impact of exhaust emissions from snow vehicles and generators, a power cable was buried approximately 250 m upwind from the living facilities. Afterwards, the observation point was decided at the edge of the power cable. In the observation area, the telescope mounting base and power supply enclosure were constructed using a combination of styrofoam blocks and wooden materials for their durability in the harsh Antarctic environment. In this presentation, onsite activities as well as highlights of performance evaluations before shipping to Antarctica will be shown.

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