SENSU SuperDARN radars essential improvement for future monitoring observation

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SuperDARN (Super Dual Auroral Radar Network) is an international high-frequency coherent radar network established in 1995 to observe the ionosphere and upper atmosphere on a global scale to obtain real-time global plasma convection and electric field potential maps, which had never been done before, to contribute primarily to space weather research. It can also address many aspects of scientific questions on the global upper atmosphere, the influence of geospace on the lower atmosphere and possible global climate change, plasma physics, and practical applied physics, including space weather nowcast/forecast. NIPR has joined the SuperDARN project since its establishment in 1995 and has been running 2 SENSU (Syowa South & East HF Radars of NIPR for SuperDARN) radars in Antarctic Syowa station (69.00 S, 39.58 E) in the polar auroral zone. Both radars have substantially contributed to the international project and scientific research, e.g., studies on auroral phenomena and storms/substorms, geomagnetic pulsations, precise neutral wind around the mesopause region using meteor echoes, studies on the polar mesospheric summer echoes (PMSEs), magnetosphere-ionosphere-neutral atmosphere vertical coupling, studies on the influence of low solar activity or grand minimum on geospace space weather.

Long-term plan-making of new Phase X 6-year JARE project (JARE 64-69, observation period: 2023.2-2029.1) starting effectively next year was discussed and finalised last two to three years especially on Prioritized Research Projects (PRP) and long-term monitoring observation. We will maintain and even accelerate Syowa SENSU SuperDARN project as an essential long-term scientific monitoring observation from this phase X JARE project for long-term stable contribution to a wider coverage of research and applications, which can also contribute to the PRP on space weather and space climate research proposed by Kataoka et al. (see Special session on this symposium.)

We will show scientific strategy of SENSU/SuperDARN research, including the PRP on space weather/climate, and focus on discussing unresolved issues and ways forward, and essential improvement for future longer-term monitoring observation that should be achieved during JARE phase X.