High-latitude SuperDARN and SENSU Syowa radars during phase X 2023-2028 and 65th JARE project

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SuperDARN (Super Dual Auroral Radar Network) is an international high-frequency coherent radar network established in 1995, currently consisting of more than 35 radars operated by more than 15 research institutes in about 10 countries, covering considerable portions of the ionosphere from middle to high latitudes in both hemispheres. The radar network plays a distinguished role in scientific research on the upper atmosphere and space weather. Originally a network of high latitude ("auroral") radars mainly for the auroral region was established, and higher or polar latitude radars called PolarDARN were deployed subsequently to improve the accuracy of the ionospheric plasma convection and electric potential map (or space weather map) especially under quiet conditions and/or lower solar activity. SuperDARN has also expanded to middle latitudes to cover a broader and lower latitude range of the ionosphere for studying disturbed storm conditions as well as distinguishing phenomena in subauroral and middle latitudes (StormDARN or Mid-Latitude SuperDARN, see the presentation by Nishitani et al. in this session). Here we try to overview the essential results and latest achievements especially by "auroral" high latitude SuperDARN and PolarDARN.
We also show the update of SENSU Syowa radars - Japanese Antarctic components of high latitude SuperDARN, especially for JARE (Japanese Antarctic Research Expedition) tenth phase 6-year project starting effectively this year in conjunction with the prioritized research project, "Aurora X cosmic" by Kataoka and his group for space weather and space climate. We will discuss mid- to long-range tangible and realistic scientific strategy of SENSU/SuperDARN research including the Aurora X cosmic project on space weather/climate and required/desired technical improvement for more stable, near-maintenance-free and more flexible and advanced operation including upgrading antennae and transmitters and imaging capability during JARE phase X period and future, as well as progress so far for coming JARE 65 for 2024 observation.

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