2024 Workshop: On the Next generation of ISRs and facilities

Long title
On the strategic vision for the next generation of ISRs and geospace facilities
Conveners
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Description

Incoherent scatter radar (ISR) systems are often recognized as the most powerful instruments for observing the geospace environment. Some of the currently operational ISRs supported by the NSF have been designed and built in the late 1950s and early 1960s (e.g., Jicamarca, Millstone Hill). Additionally, some of the ISRs have been closed in the past several years (e.g., Sondrestrom, Arecibo) for various reasons. Even some of the newer ISRs (e.g., PFISR) use technology that is 20-30 years old. Therefore, an update of the ISR facilities is needed to allow new and more continuous observations so that outstanding science questions can be addressed. It is envisioned that an update would also have an impact on lowering the costs associated with operations while expanding community engagement and increasing scientific output.

Given the status of the ISR facilities, a workshop open to the community addressed a strategic vision for ISRs. The workshop was held in April 2021, and a report summarizing the main findings and community inputs was released (http://landau.geo.cornell.edu/workshop_report.pdf). The workshop identified a wide range of priority research areas and science questions that reinforced the necessity of the development of the next generation of geospace radar facilities. The workshop also identified three main themes and recommendations: 1. To utilize of emerging technologies. 2. To leverage knowledge and resources from other communities, and 3. To develop workforce and stablish collaborations.

The objective of this CEDAR workshop is to revisit the importance of the ISR facilities to the CEDAR community and the status of these facilities. This workshop will also

revisit some of the research areas and science questions that would benefit from the development of the next generation of geospace facilities. The session will address some of the observational capabilities that would be desired for the new facilities. This includes ideas for the collocated deployment of different instruments and observations. Finally, the session would address the benefits of such a facility for education and training of the next generation of geospace scientists and engineers.

Agenda

16:00 - Lindsay Goodwin, 2024 ISR Workshop Update

16:15 - David Hysell, The subauroral E region

16:30 - Shantanab Debchoudhury and Matthew Zettergreen, Atmosphere-ionosphere coupling from below due to lower atmospheric disturbances

16:45 - Roger Varney, Ionosphere to inner magnetosphere coupling via mass and heat flows

17:00 - William Longley, Instabilities and nonlinear physics

17:15 - Toshi Nishimura, A need of mid-latitude ISRs for subauroral science: Electrodynamic coupling

17:30 - Phil Erickson, Strong subauroral dynamic responses to geomagnetic storms as seen from existing and future subauroral IS radars

17:45 - Asti Bhatt, Converting PFISR into a multi-static ISR: An initial concept

Justification

Incoherent scatter radar facilities are an important component of the observational capabilities available to the CEDAR community. This workshop will provide an opportunity for the community to revisit some of the main findings of the 2021 workshop. It will also provide an opportunity for the community to learn about potential directions given the recommendations put forward by the 2021 workshop report as well as about new findings that resulted from an effort by various members of the CEDAR community.

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