A decade with the Canadian High Arctic Ionospheric Network (CHAIN) Ionosondes

David R. Themens*(1), P. T. Jayachandran(1), Todd Kelly(1), Richard Chadwick(1), Chris Watson(1), Anthony McCaffrey(1), Anton Kashcheyev(1), Aaron Farnham(1), Joey Bernard(1), Karim Meziane(1), Swadesh Patra(1), Jeffrey Langille(1), and Ben Reid(1),
(1) Department of Physics, University of New Brunswick, Fredericton, NB, Canada, e-mail: david.themens@gmail.com

The Canadian High Arctic Ionospheric Network (CHAIN) began operations in 2008 by first taking over the management of several Canadian Advanced Digital Ionosonde (CADI) systems and then expanding the network through Phase 1 to include six ionosondes and ten scintillation monitor GNSS receivers [1]. The network was later expanded again in 2013, adding 15 more scintillation monitor GNSS receivers, and was further expanded in 2018 to its current state comprising ten ionosondes and 28 scintillation monitor GNSS receivers. A map of the current network is provided in Figure 1. The CHAIN ionosondes cover the entire Canadian Arctic region and fill a gap in global ionospheric network coverage.

This discussion will provide an overview of CHAIN network observations and capacity, the availability of CHAIN data, our plans for the future of the network, and an introduction to the supplementary data products provided by CHAIN, such as its near-real-time 3D ionospheric assimilation system and its probabilistic scintillation model. We will furthermore conduct a detailed analysis of CHAIN CADI data quality and release a cross-validated database of manually scaled Resolute CADI inverted parameters with well-characterized error statistics to the community for open use.

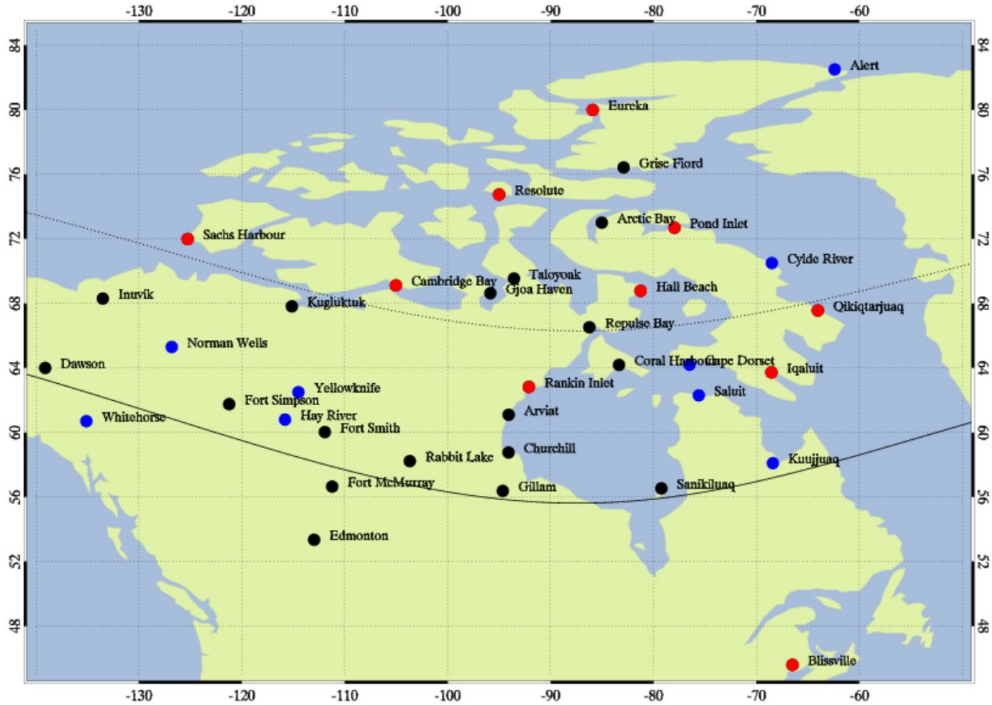

Figure 1. A map of the geographic distribution of CHAIN stations. Red dots correspond to locations with collocated CADI and GNSS receiver systems, black dots correspond to locations with just GNSS receivers, and blue dots correspond to planned expansion stations. Solid and dotted black lines represent 65°N and 75°N geomagnetic latitudes, respectively.

References

[1] Jayachandran, P. T., et al. (2009), Canadian High Arctic Ionospheric Network (CHAIN), Radio Sci., 44, RS0A03, doi:10.1029/2008RS004046.