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HF RADAR EXPERIMENT AT SYOWA STATION FOR THE STUDY OF HIGH-LATITUDE IONOSPHERE: A PROPOSAL (EXTENDED ABSTRACT)

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As one of ground-based upper atmosphere observations at Syowa Station, Antarctica (69°00′S, 39°35′E), during the forthcoming STEP (Solar-Terrestrial Energy Program) period (1990–1995), an HF radar experiment for exploring the auroral and polar cap ionospheres is proposed.

Now, we have two VHF (50 and 112 MHz) Doppler radars at Syowa Station for detecting radio auroras in the *E*-region at slant ranges of 250–400 km to the south (IGARASHI *et al.*, 1982). In principle, these radars, however, cannot investigate the regions beyond 400 km, that is, the cleft and the polar cap located at latitudes higher than Syowa Station. In order to overcome this defect, we propose here a construction of the HF radar which can detect back-scattered echoes from far distant regions ranging from 300 km to a few thousand km.

An HF radar measures back-scattered power and Doppler spectrum due to ionospheric irregularities in the *E*- and *F*-regions (GREENWALD *et al.*, 1985). Its usefulness for studying both polar ionospheric processes like plasma convection (drift velocity) in the polar cap, cleft and auroral regions and irregularity production and dissipation mechanisms have been already demonstrated by the Goose Bay HF radar which was established in 1983 (*e.g.*, WALKER *et al.*, 1986) and by other HF radars (*e.g.*, GREENWALD *et al.*, 1983). These observations, however, have been exclusively made in northern high latitudes.

The proposed Syowa Station HF radar can observe the *E*- and *F*-region ionosphere over the Antarctic Continent, and further more this radar constitutes a twin HF radar system with the Halley Bay HF radar (75°31′S, 26°36′W) operated by the British Antarctic Survey, which enables us to determine a two-dimensional flow pattern of ionospheric plasmas (see Fig. 1). The Halley Bay radar began its operation in February 1988.

As shown in Fig. 1, an ionospheric region illuminated commonly by the Antarctic twin radars is geomagnetically connected with that over Greenland which is also covered by the existing twin HF radars in Quebec, Canada: one at Goose Bay operated by the Applied Physics Laboratory of the Johns Hopkins University, USA, and the other at Schefferville by the University of Toulon, France. Conjugate ob-

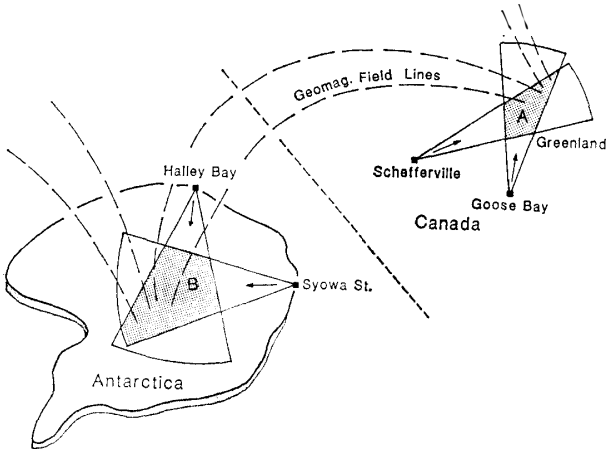

Fig. 1. Schematic illustration of the viewing areas by Antarctic twin HF radars (B) and Canadian twin HF radars (A). A and B constitute a geomagnetically conjugate pair.

servations of plasma convection and irregularities are very useful for understanding similarities and dissimilarities of the phenomena between the both hemispheres and for diagnostics of the whole magnetosphere.

Finally, it is stressed that an international cooperation among the countries and organizations concerned is highly desirable to obtain fruitful scientific results.

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