

# An OMSKI for SANAE

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An OMSKI (Omega and MSK instrument) receives and records the phase and amplitude of four transmitter signals simultaneously (Adams, 1990). An OMSKI will be installed at SANAE in 1993 to record VLF radio signals transmitted from NAA and NSS on the east coast of the United States and from Liberia (LIB) and Argentina (ARG). The same transmissions will be recorded simultaneously at Halley, the British Antarctic Base, using an identical receiver. The signal paths to Halley (HB) and SANAE (SE) are shown in Figure 1.

The amplitude and phase of these waves propagating in the earth-ionosphere waveguide are altered by ionization formed beneath the ionosphere. Radio communications may be completely disrupted by ionization produced by X-rays associated with solar flares or by electrons that cause aurorae. Particular interest exists in a smaller perturbation of radio communications, known as a *trimp* (Helliwell *et al.*, 1973), which is caused by a patch of ionization produced by electrons which have been induced to precipitate from the magnetosphere by very low frequency radio waves generated in lightning strokes. The *trimp* phenomenon is described in this issue in a paper by Hughes and Scourfield and five *trimp* events on a signal propagating to SANAE from the NAA transmitter in North America are shown in Figure 6 (page 190). It may be described briefly as a perturbation in phase and amplitude on a transmitter signal which lasts typically 40 seconds. It has a sharp onset lasting one to two seconds caused by the initial electron precipitation followed by a recovery phase which corresponds to the decay of the ionization patch. The phenomenon is caused by radio waves generated in lightning strikes which resonate with energetic electrons as they propagate through the magnetosphere.

A preliminary study of *trimp* precipitation was carried out (Friedel and Hughes, 1990) on data recorded at SANAE during

1982. It was only possible to study amplitude *trimp*s with those data but it was clear that *trimp*s were present in sufficient numbers to justify an experiment to study all aspects of the phenomenon at SANAE.

The OMSKI is expected to yield valuable information on:

- wave particle interactions in the magnetosphere;
- the scale of wave induced precipitation regions;
- the effect of auroral particle precipitation on the phase and amplitude of waves propagating in the earth-ionosphere waveguide.

## REFERENCES

- ADAMS CDD 1990. *Perturbations in Subionospheric propagation at VLF*. PhD thesis, University of Otago, Dunedin, New Zealand
- FRIEDEL RHW & HUGHES ARW 1990. Characteristics and frequency of occurrence of *trimp* events recorded during 1982 at Sanae, Antarctica. *J. atmos. terr. phys.*, 52: 329
- HELLIWELL RA, KATSUFRAKIS JP & TRIMPI ML 1973. Whistler induced amplitude perturbations in VLF propagation. *J. Geophys. Res.*, 78: 4679



Fig 1 The paths to Halley(HB) and SANAE(SE) of transmitter signals which will be monitored for *trimp* events