We started clearing the snow passage. This was back-breaking; we would only just clear it when a new storm would fill it up again. Gradually the walls grew higher as we used the snow that we had dug out to build them up.

Most of our boxes were located from photographs which had been taken before the storm and we were able to establish a bulk diesel fuel store by laying five or six rows of drums on top of each other at one end of the snow passage. By 1st March we had moved over 400 tons from the passages and buildings. Our calculations were probably conservative.

Gradually as work inside the base progressed, the agony of the searing pain in our finger joints started to ease. We were finally able to get mattresses and extra blankets. The sewing machine was unearthed and we were able to start repairing our clothes.

At the end of March and beginning of April we finally wired up lights from the main generators and managed to get our communications going. With the temperatures plummeting towards −30°C we finally started the meteorological tower. By now we had all suffered from frostbite in various degrees – but fortunately nothing serious.

The outside work came to a halt and we tackled the job of applying fire retardant paint to the inside of the base. No matter how carefully we worked we could not get the stuff to stick to the varnished plywood and only tremendous effort on our part enabled us to complete this job. However, the final finish fell far short of the manufacturer's recommendation.

About this time we were able to start working on our scientific programmes to varying extents. The work on the base would still limit and rule our activities for the rest of the year, but the mere fact that we were able to spend some time on scientific projects marked the end of phase one. Phase two was in fact the scientific work; this was why we had come and it was to enable this work to be done in greater comfort and safety that the Department of Transport had commissioned the new base.

SCIENCE

THE IONOSPHERE

Part 2 – Ionospheric Research at Sanae

To a first approximation, the Earth's magnetic field may be regarded as that of a dipole magnet. However, this magnet should be regarded as being displaced from the centre of the globe towards Vietnam. This results in a very strong magnetic field region in the vicinity of Vietnam and a "weak spot" on the opposite side of the globe viz. the South Atlantic region. The region of anomalously low magnetic intensities is known as the South Atlantic Geomagnetic Anomaly. A consequence of this is that electrons trapped in the Van Allen radiation belts surrounding the Earth are able to penetrate deeper into the atmosphere in the South Atlantic region than elsewhere and as a result would cause more ionization in this region than elsewhere at similar latitudes. Satellite observations have confirmed that large fluxes of charged particles are being precipitated into the ionosphere in the vicinity of Sanae. These regions of high particle intensities are shown in Fig. 1 and it can be seen from this that Sanae is ideally situated to study the effects of this radiation.

South African interest in the Antarctic polar ionosphere began with an experimental programme designed to detect possible effects of corpuscular radiation in the South Atlantic Geomagnetic Anomaly. Whether or not the electrons would interact sufficiently with the atmosphere to produce observable geophysical effects had been a matter for speculation until 1961, when two American scientists, Cladis and Dessher, suggested that balloons carrying X-ray equipment should be launched south of Cape Town to detect bremmstrahlung X-rays produced by bombarding electrons.

Gledhill and Van Rooyen of Rhodes University initiated South African research in this field by theoretically examining the possibility of corpuscular effects. They predicted that there should be observable airglow, enhanced heating, X-ray and ionization effects in this region. Consequently, an ionospheric and airglow observatory was established at Sanae for the purpose of observing these phenomena.

The first ionospheric measurements were made at Sanae in 1962 by D. C. Baker (Sanae 3) and in subsequent years by:

D. G. Torr	Sanae 4	1963
M. B. Ezekowitz	,, 5	1964
D. W. Sharwood	,, 6	1965
D. P. Homann	,, 7	1966
A. W. V. Poole	,, 8	1967
M. H. Williams	,, 9	1968
S. Engelbrecht	,, 10	1969
D. W. L. Scorgie	,, 11	1970
R. Haggard	,, 12	1971

A number of papers have appeared on the observations made at Sanae and the results of these will be discussed in the ionosphere articles to follow.

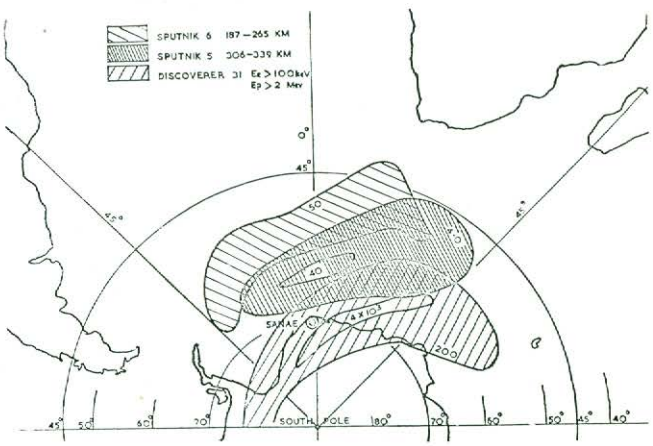

Figure 1.