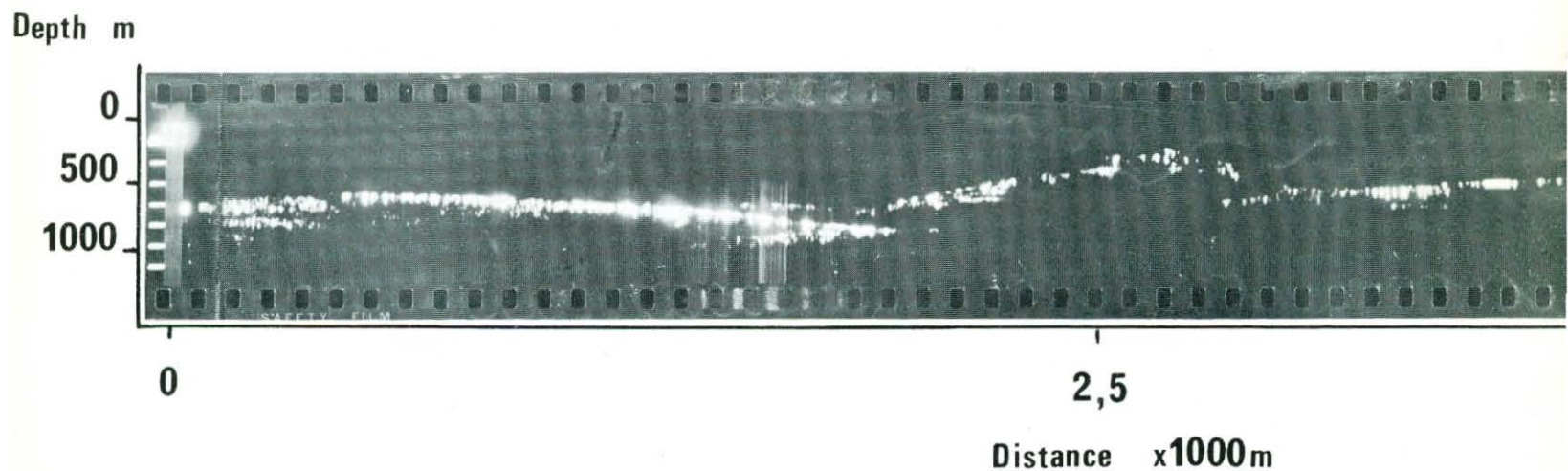
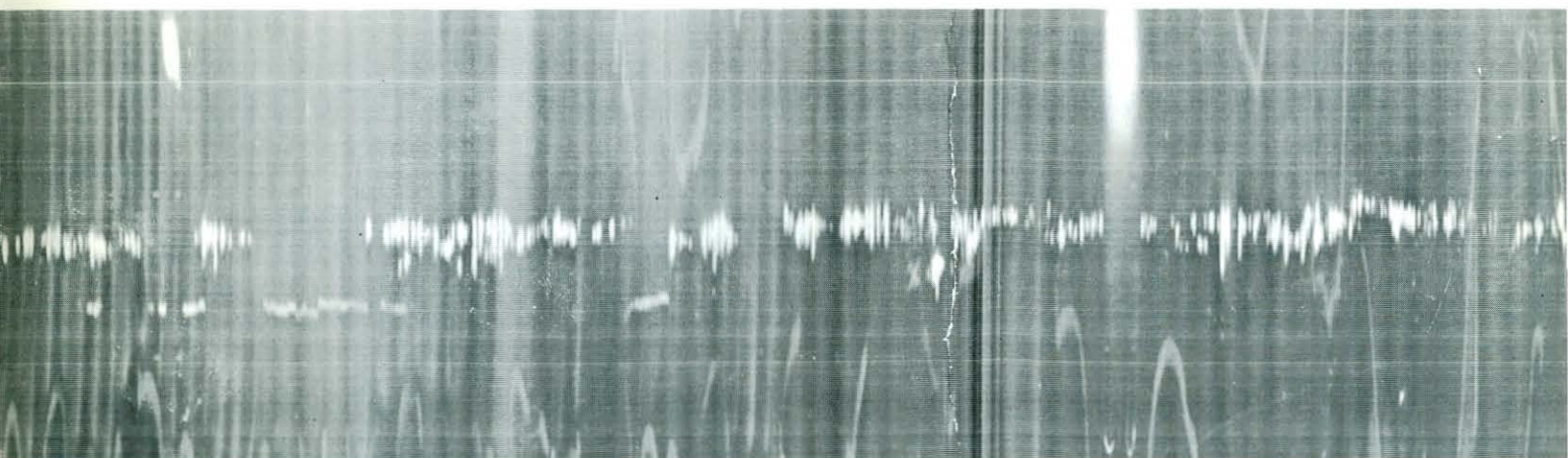


RADIO ECHO SOUNDING

by T. G. SCHAEFER





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DISTANCE (km)

If one considers that about 17 million square kilometres of land lie within the earth's polar regions and that 95 per cent of this land is covered by an ice sheet having an estimated average depth of 2 000 m, then the geological significance of being able to study the sub-glacial landscape of the polar regions is immediately obvious.

Radio echo sounding is the name given to the operation of mapping the sub-glacial topography in polar regions using radar techniques.

It has been shown that ice is "transparent" to radio waves in the frequency band between 10 MHz and 500 MHz – this means that radio signals in this frequency range can travel through ice without excessive losses.

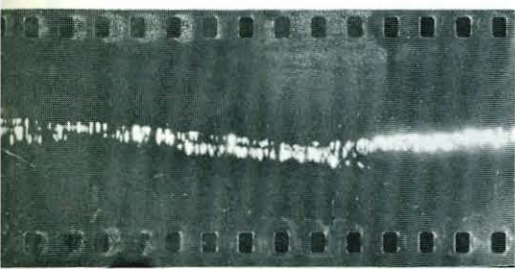
Because of this fact, it is possible to transmit signals into ice and to receive the reflected signal again, as with a normal radar, and in the process information about the sub-surface is gained. So ice depths can be measured and hence the shape of sub-glacial landforms can be determined. In addition, recent investigations by the Scott Polar Research Institute (SPRI) at Cambridge University, U.K., have shown that the basic sub-glacial rock types can also be identified from the radio echo sounder records.

In 1970 the South African Antarctic Earth Sciences Programme acquired a radio echo sounder from the Scott Polar Research Institute. This instrument, the 35 MHz SPRI Mk II echo sounder, was placed in service at Sanae in 1971. During 1971, 1972 and 1973 the instrument was operated successfully over hundreds of kilometres traversed in the Ahlmannryggen and Borgmassivet areas of Dronning Maud Land. The data so obtained has added significantly to our knowledge of the sub-glacial terrain in these areas.

In 1972 and 1973 a new echo sounder was developed locally and this instrument was scheduled for commissioning at Sanae in 1974. It is hoped that the Sanae 144 MHz Radio Echo Sounder will obtain soundings from greater depths than proved measurable by the SPRI Mk II sounder.

Figure 1 is a typical reproduction from the echo sounder's photographic record, showing "mountains beneath the ice".

Figure 2 is a typical echo sounding profile obtained over the relatively smooth-bottomed ice shelf.



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