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CORRESPONDENCE

The Editor,

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SIR,

The resistivity of sea ice

In a recent article Timco (1979) deduced the microstructure of sea ice in terms of brine-cell geometry from d.c. geoelectrical soundings. This is a valuable contribution to knowledge of electrical conduction in sea ice. It is understandable that some simplifications had to be introduced for a first approach to facilitate the theoretical treatment. Thus, a simple model of brine-cell configuration was legitimately used and a transversely isotropic distribution of the electrical field (i.e. conductivity independent of the azimuth) was assumed (Timco, 1979, 1980).

The field data represent a three-layer case; two layers of different conductivity in the ice and sea-water as a third layer. Evaluating the data correspondingly for those nine sites (2–9), where the measurements have been carried out on cross profiles, yields the results given in Table I.

TABLE I. RESISTIVITY OF TWO PERPENDICULAR PROFILES AT SITES 2–10

Site No.	2	3	4	5	6	7	8	9	10
	Ω m	Ω m	Ω m	Ω m	Ω m	Ω m	Ω m	Ω m	Ω m
Profile (a)	120	60	153	55	230	148	152	110	169
Profile (b)	94	70	152	86	178	121	210	120	164

This table only contains the resistivity of the second layer of the cross profile which actually represents most (three-quarters) of the ice cover. Appropriate evaluation of the field data (ice resistivity curves) thus demonstrates that the resistivities at the same point are different in different directions and that the sea ice is not necessarily laterally homogeneous. The geoelectrical profiles were oriented either perpendicular (a) or parallel (b) to the shore line or the long axis of Eclipse Sound respectively. As part of the expedition, current measurements have been carried out sporadically at different depth and locations. The mean current direction was parallel to the shore line (Grothues-Spork, 1974).

It would be interesting to incorporate the above facts into a further approach to obtain a more comprehensive view of the relation between the microstructures and the electrical conductivity of the sea ice.

Additional information on the measurements and the results of the expedition are presented by Thyssen and others (1974) and Kohnen (1976[a], [b]).

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REFERENCES

Grothues-Spork, H. 1974. Aufmessung der Strömungen unter dem Eis des Eclipse Sound (Baffin Island) und Bestimmung von Reibungskoeffizienten zwischen Stahl und Eis. *Polarforschung*, Jahrg, 44, Nr. 1, p. 76–82.

Kohnen H. [1976.] On the dc-resistivity of sea ice. *Zeitschrift für Gletscherkunde und Glaziologie*, Bd. 11, Ht. 2, p. 143–54.

Kohnen, H. 1976. Glaciological research relevant to the construction of ice-going ships. *Ocean Engineering*, Vol. 3, No. 5, p. 343–60.

Thyssen, F., *and others*. 1974. DC resistivity measurements on the sea ice near Pond Inlet, N.W.T. (Baffin Island), by F. Thyssen, H. Kohnen, [V.M.] Cowan, and G. W. Timco. *Polarforschung*, Jahrg. 44, Nr. 2, p. 117–26.

Timco, G. W. 1979. An analysis of the *in-situ* resistivity of sea ice in terms of its microstructure. *Journal of Glaciology*, Vol. 22, No. 88, p. 461–71.

Timco, G. W. 1980. On the lateral variation of the d.c. resistivity of sea ice. *Journal of Glaciology*, Vol. 25, No. 91, p. 191–92. [Letter.]