



FIG. 8. Comparison of the ESMR data for 30 January 1973 with boundaries depicted in the USN Polar Atlas (Daniel, 1957). The outer edge of the ice pack (less than 0.1 concentration) was used in both cases.

A preliminary analysis of the Antarctic and Greenland ice sheet emissivities derived from the ESMR measurements shows that they are practically constant for the period from December 1972 to July 1973. We conclude, therefore, that this invariance of emissivities with seasons is a further indication that they are correlated primarily with structural rather than with temperature variations in the ice.

6. Concluding remarks

We have shown here some of the early results from the data acquired by the ESMR on board the Nimbus-5 satellite. We draw four main conclusions from these results: 1) Large discrepancies exist between the long-term ice cover depicted in various atlases and the actual extent of the canopies. 2) The distribution of multiyear ice in the north polar region is markedly different from that predicted by existing ice dynamics models. 3) Irregularities in the edge of the Antarctic sea ice pack occur that have neither been observed previously nor anticipated. 4) The brightness temperatures of the Greenland and Antarctic glaciers show interesting contours probably related to the ice and snow morphologic structure.

It is clear that imaging thermally-emitted microwaves with satellites is a powerful tool for studying sea ice coverage, type, and distribution in the polar areas of Earth. The independence of this technique from cloud cover in the polar regions will permit a detailed study

of the sea ice characteristics as a function of time. The ESMR images are already being used operationally as an aid to navigation in polar waters (Ellinghausen, 1973).¹ More analysis will be done when a larger data base has been acquired. Work in progress includes a more precise determination of the actual extent of the multi-year ice pack in the Arctic, observations of the ice pack motion on a longer time scale using smaller time intervals, a study of the open water distribution as a function of time, and finally a test of the consequences of utilizing the open water distribution information in a global weather model study. It is hoped that the early results presented here will inspire others to conceive still other applications of these data.

¹ Private communication.

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