NOAA Technical Memorandum ERL WPL-75

HF RADAR MEASUREMENTS OF SURFACE CURRENTS IN THE GERMAN BIGHT DURING MARSEN PHASE 2

PART II: 24 to 28 SEPTEMBER 1979

R. S. Lyons

Wave Propagation Laboratory
Boulder, Colorado
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UNITED STATES DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
John V. Byrne, Administrator

Environmental Research Laboratories
Joseph O. Fletcher, Acting Director

HF RADAR MEASUREMENTS OF SURFACE CURRENTS IN THE GERMAN BIGHT DURING MARSEN PHASE 2 PART II: 24 to 28 SEPTEMBER 1979

Robin S. Lyons

ABSTRACT. Instantaneous surface currents measured with an HF radar system (called CODAR) during the MARSEN experiment are presented for 24 to 28 September 1979, to complete the data set for sampling every 4 h.

INTRODUCTION

The NOAA-CODAR group participated in the MARSEN (Marine Remote Sensing experiment) of Fall 1979. Surface currents in the German Bight were measured by CODAR (Coastal Ocean Dynamics Applications Radar) systems from 18 September to 11 October 1979. The CODAR technique is described by Barrick et al. (1977) and the experiment is described by Janopaul et al. (1981). The CODAR experiment was basically divided into two parts: 4-h sampling intervals from 18 September to 28 September 1979, and hourly intervals from 28 September to 11 October 1979. The data set of 18 September to 24 September is displayed by Janopaul et al. (1981), and the remaining 4-h data are given here.

DISCUSSION

Instantaneous surface currents are presented in Figs. 1-25 for 4-h-interval CODAR data from 0418 LT, 24 September, through 0418 LT, 28 September 1979. The 18th min past the hour is the center of our 36-min time series starting every 4 h on the hour. Each current vector depicted is an average of all values in its 10-km-radius circle. All vectors are numerically edited using thresholds of relative error and of signal-to-noise ratio (S/N). For example, if $S/N<10^3$ for a vector, it is removed. The resulting vectors in each map are further edited to remove questionable data due to interferences described below. No extrapolation or interpolation techniques replace any removed vectors in the data set. These surface current data follow the dominant semidiurnal tidal cycles of the region as previously noted by Janopaul et al. (1981).

Some maps provide good area coverage of surface currents, i.e., 0418 LT, 24 September (Fig. 1) and 0818 LT, 24 September (Fig. 2); coverage in others is severely limited, i.e., 1218 LT, 24 September (Fig. 3). Our coverage area at times was greatly diminished because of two major factors. First, an ionospherically propagated radio signal of unknown origin caused strong RF interference between 900 and 1600 LT, which greatly affected our radar signal coverage by significantly reducing our signal-to-noise ratio. Second, the radar receivers malfunctioned intermittently at our radar sites, Helgoland and St. Peter-Ording, W. Germany, making them more sensitive to near-band and in-band RF interference; this is always a potential problem.

CONCLUSION

This set of surface current maps for 24 September to 28 September 1979 concludes the data sets involving the 4-h sampling rate of the NOAA-CODARs participation in the MARSEN Fall 1979 experiment. The hourly data of 28 September to 11 October 1979 will be processed differently and presented in the future.

ACKNOWLEDGMENTS

Support for this research was provided by the Office of Naval Research and by Ocean Technology and Engineering Services, NOAA.

REFERENCES

Barrick, D. E., M. W. Evans, and B. L. Weber, 1977: Ocean Surface Currents Mapped by Radar, Science, 198:138-144.

Janopaul, M. M., A. S. Frisch, and R. S. Lyons, 1981: HF radar measurements of surface currents in the German Bight during MARSEN Phase 2; part I:18 to 24 September 1979, NOAA Technical Memorandum ERL WPL-71.

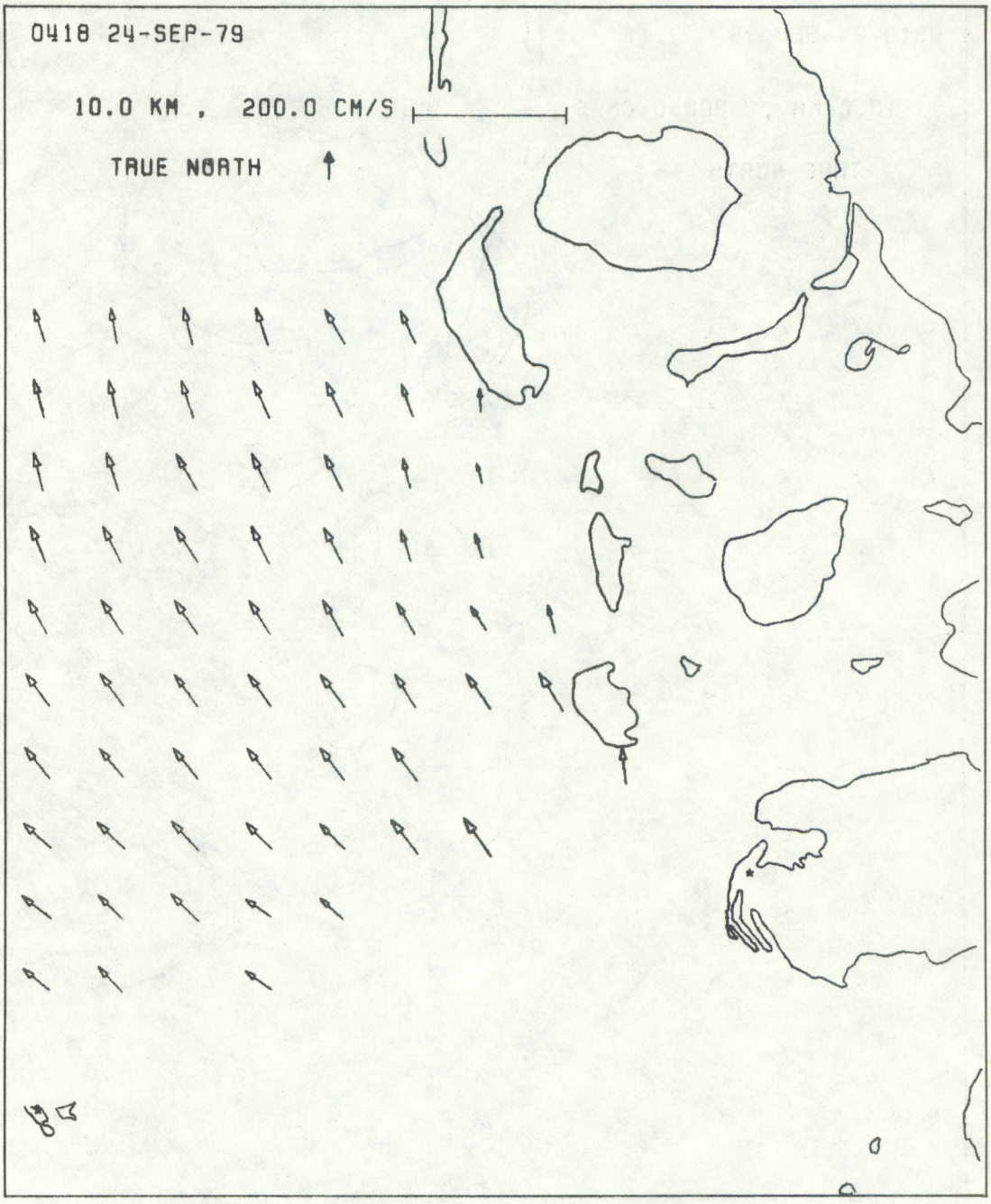

Figure 1.--Surface current vectors at 0418, 24 September 1979.

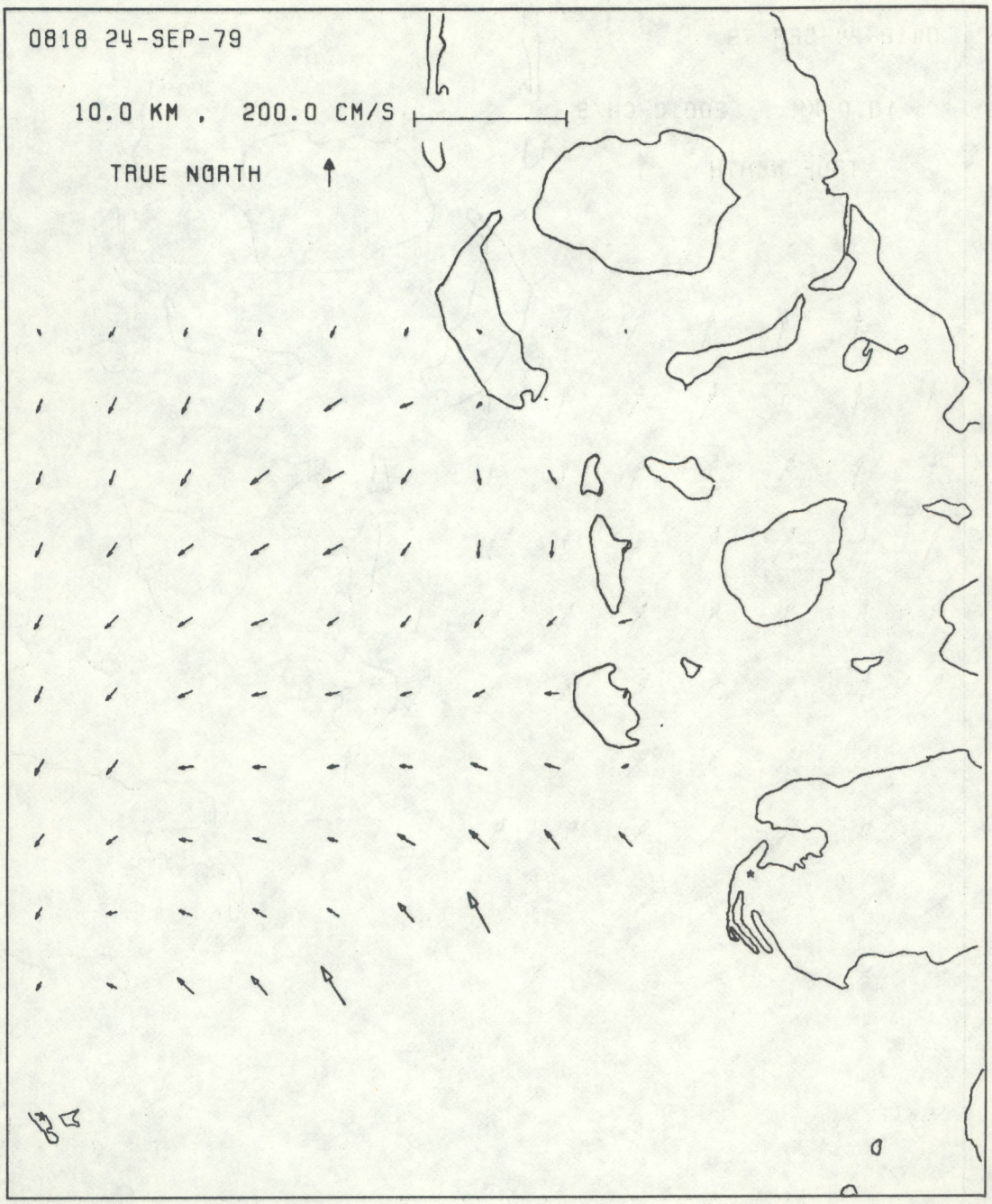

Figure 2.--Surface current vectors at 0818, 24 September 1979.

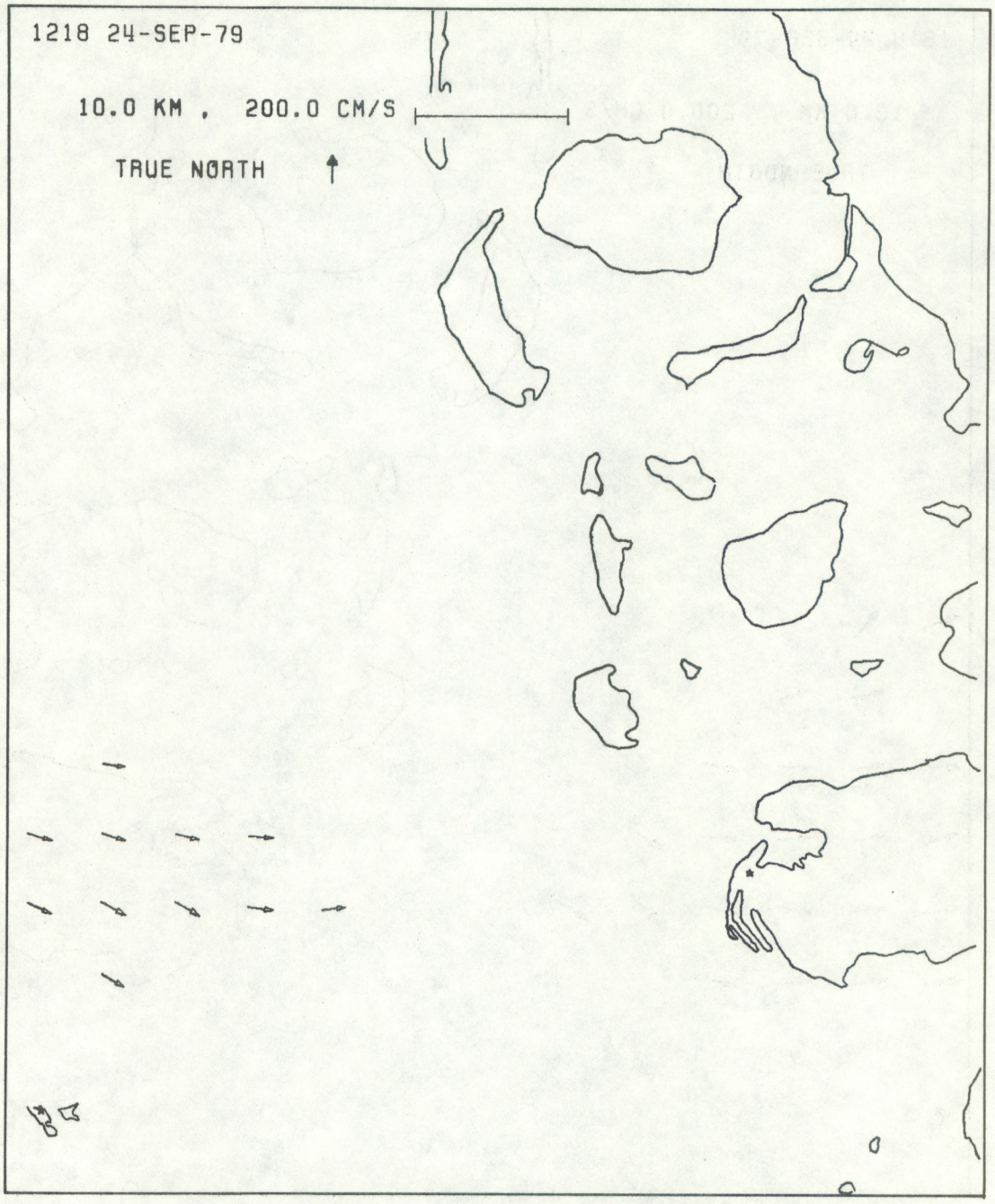

Figure 3.--Surface current vectors at 1218, 24 September 1979.

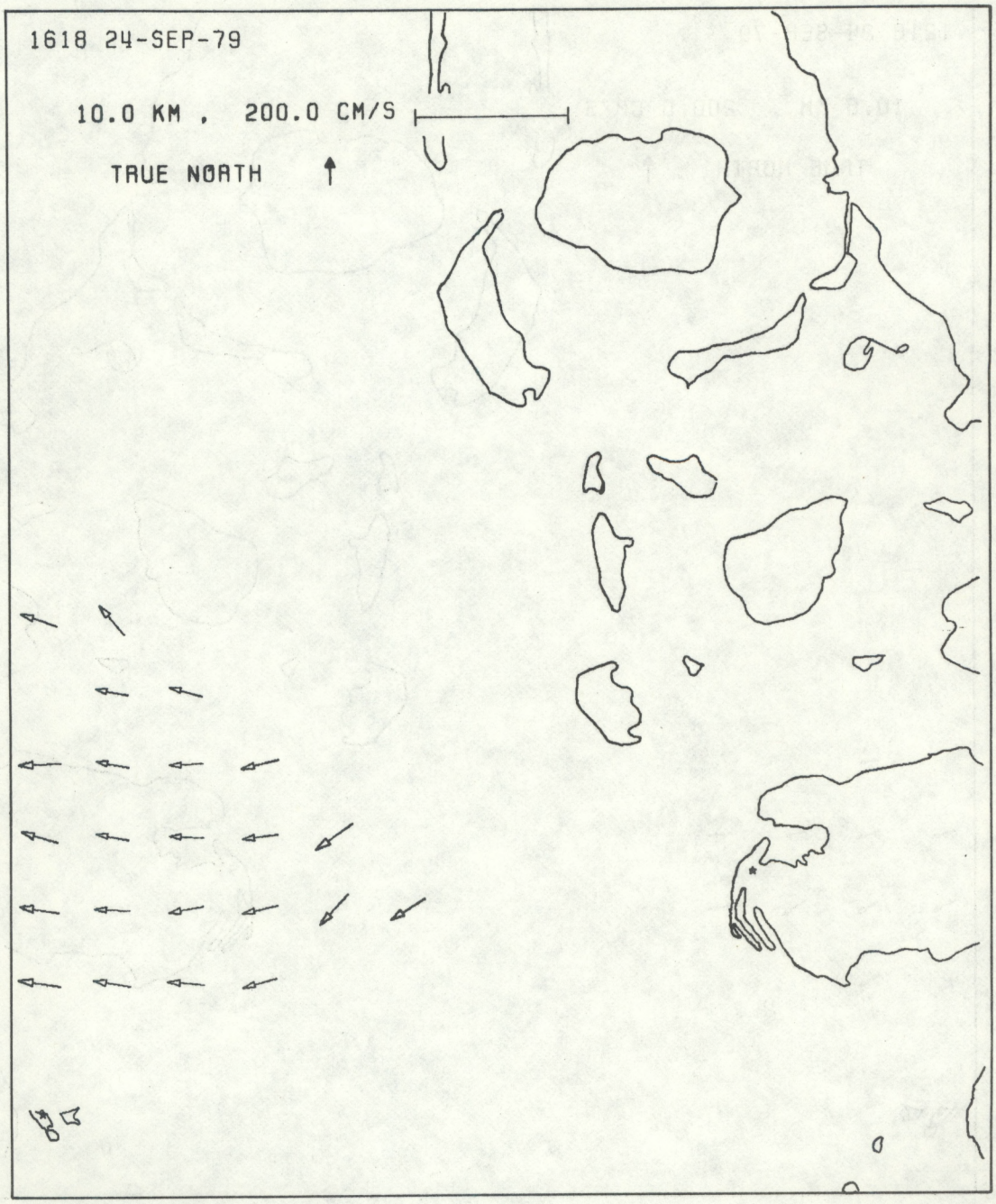

Figure 4.--Surface current vectors at 1618, 24 September 1979.

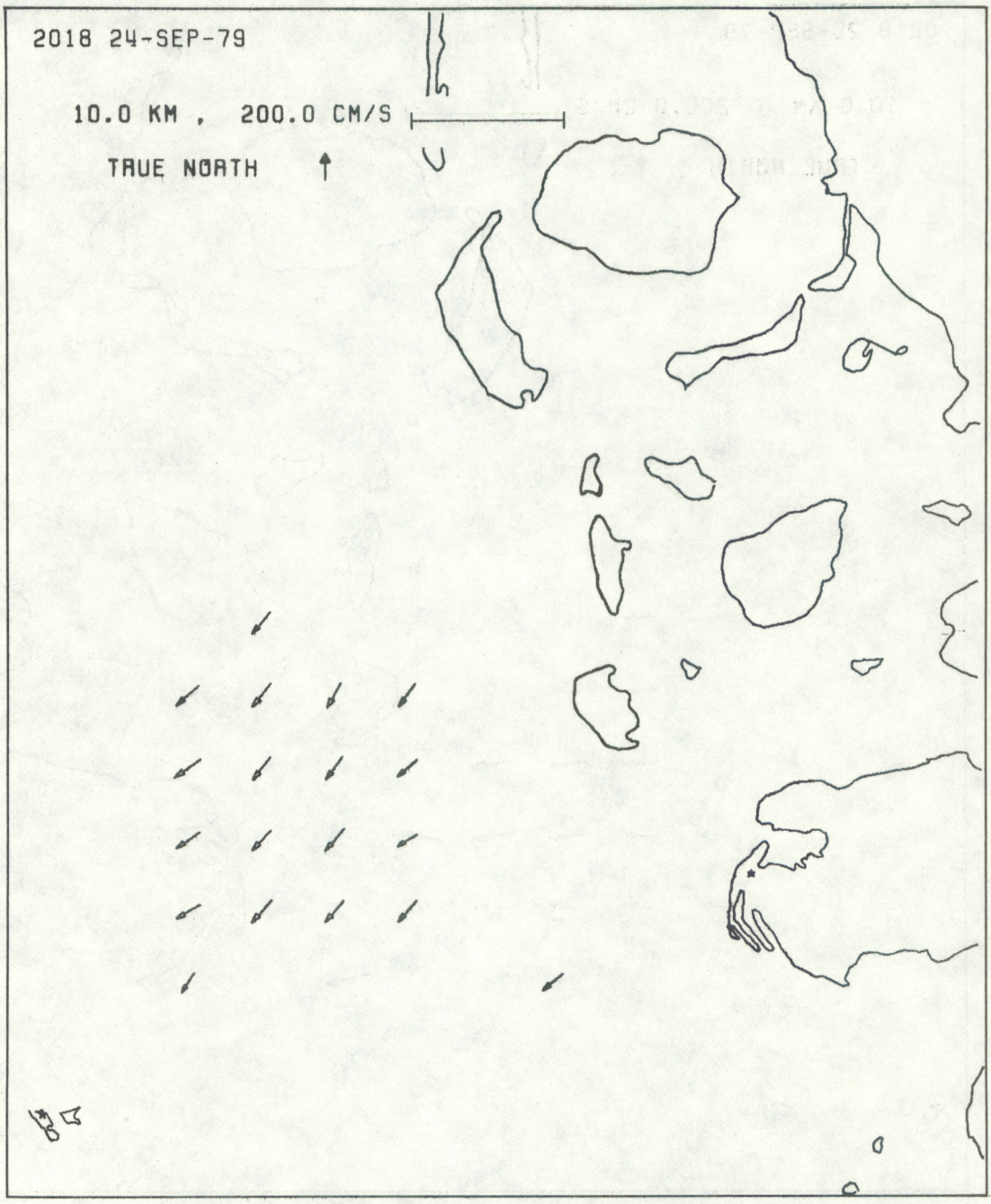

Figure 5.--Surface current vectors at 2018, 24 September 1979.

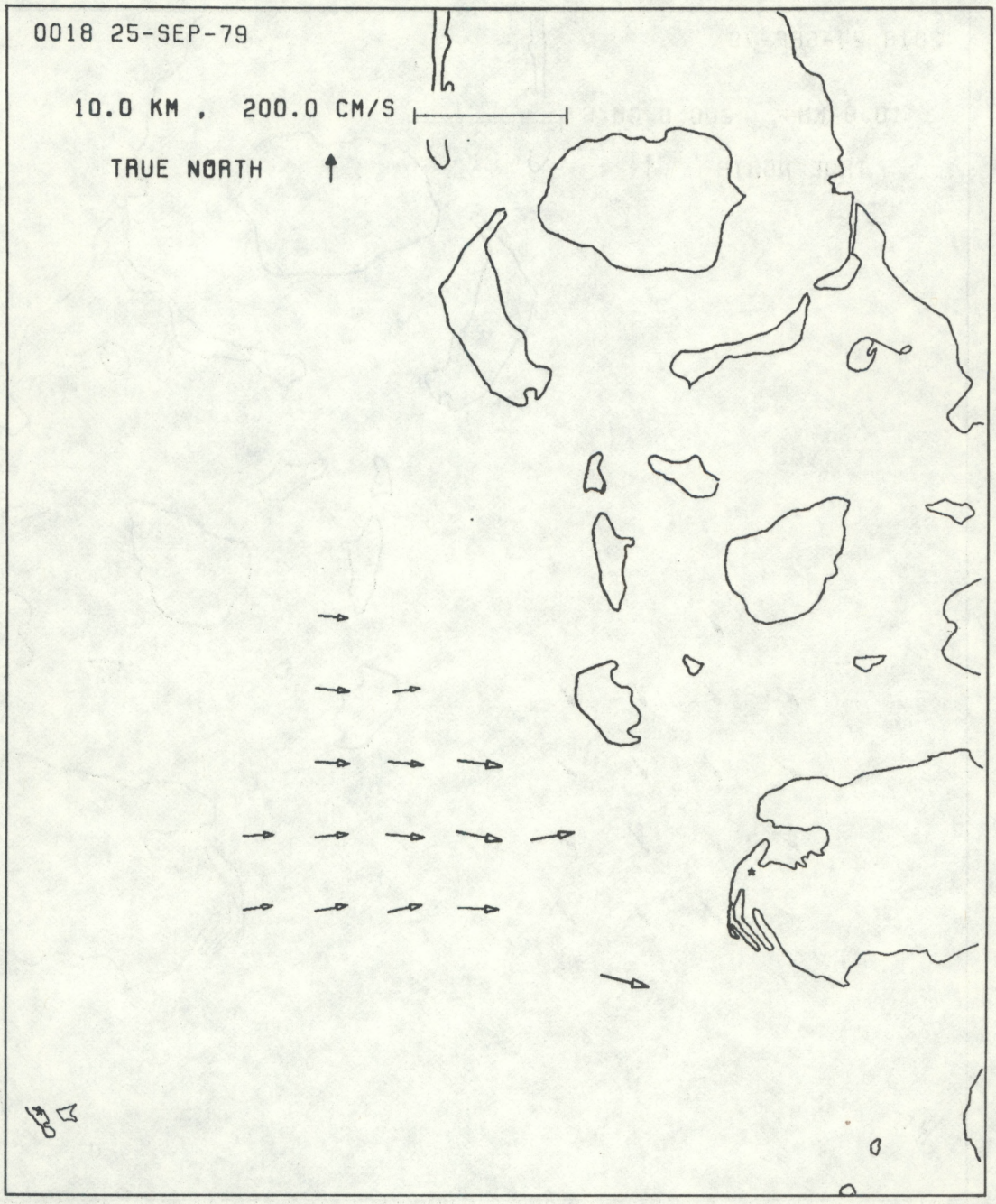

Figure 6.--Surface current vectors at 0018, 25 September 1979.

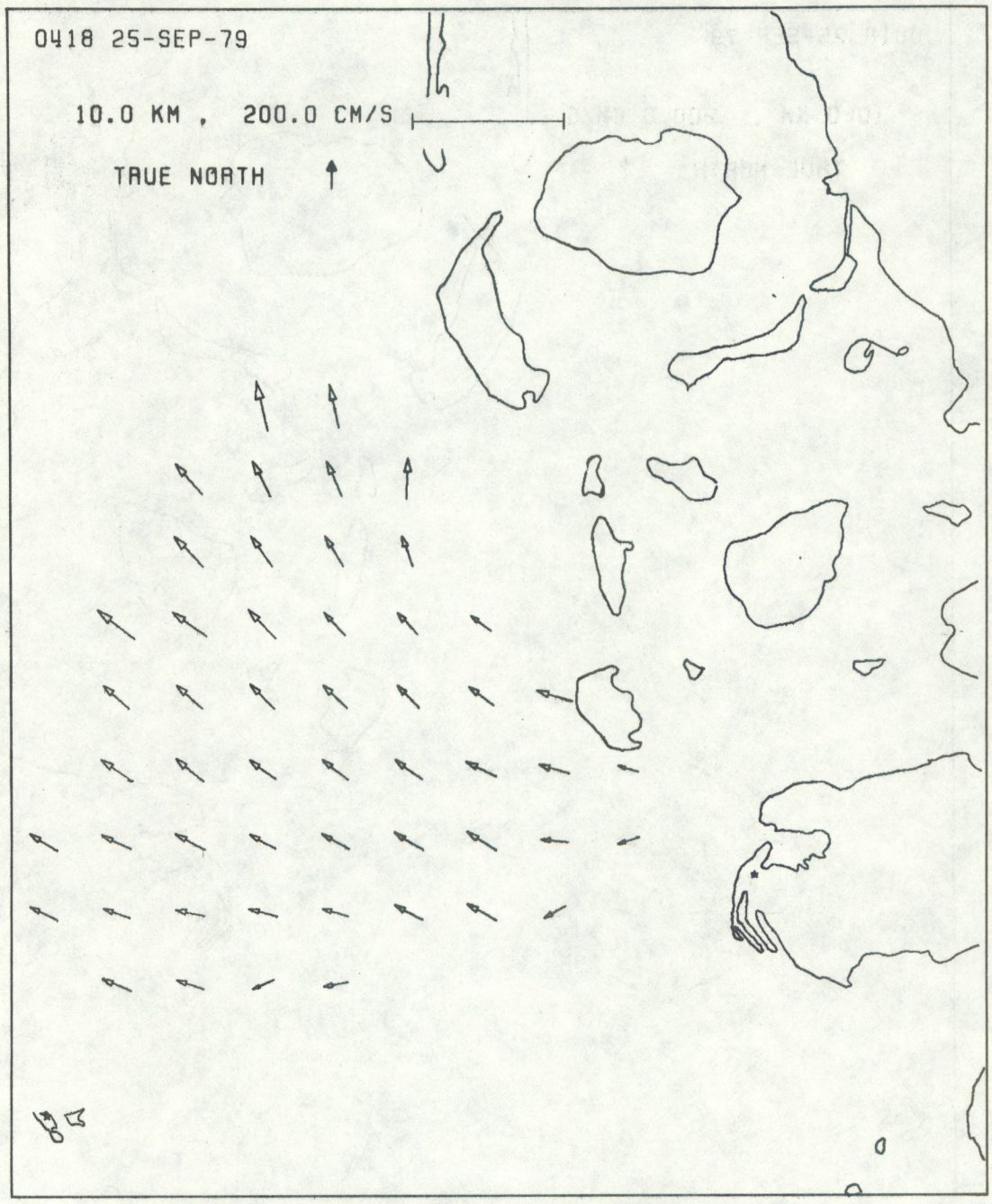

Figure 7.--Surface current vectors at 0418, 25 September 1979.

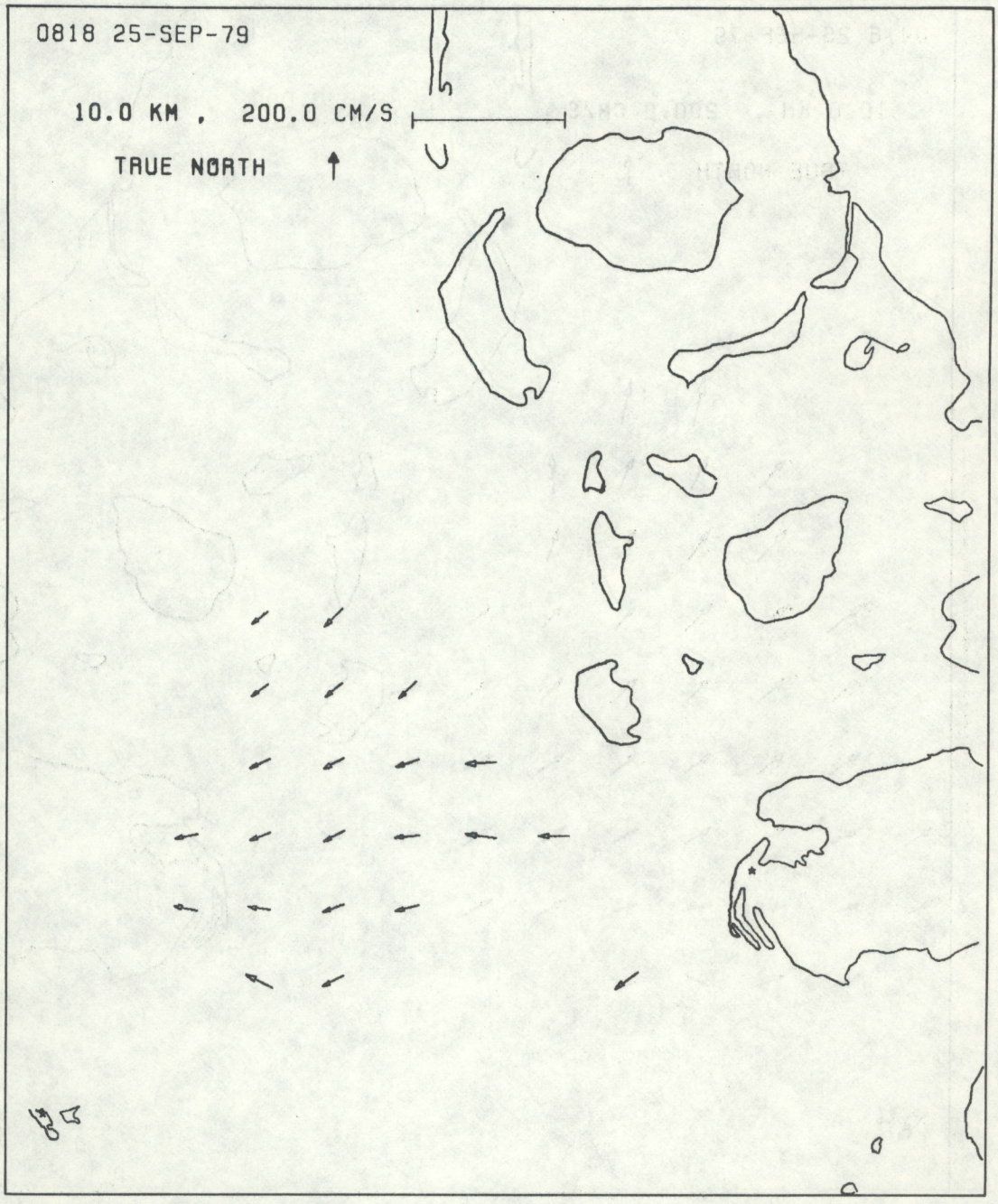

Figure 8.--Surface current vectors at 0818, 25 September 1979.

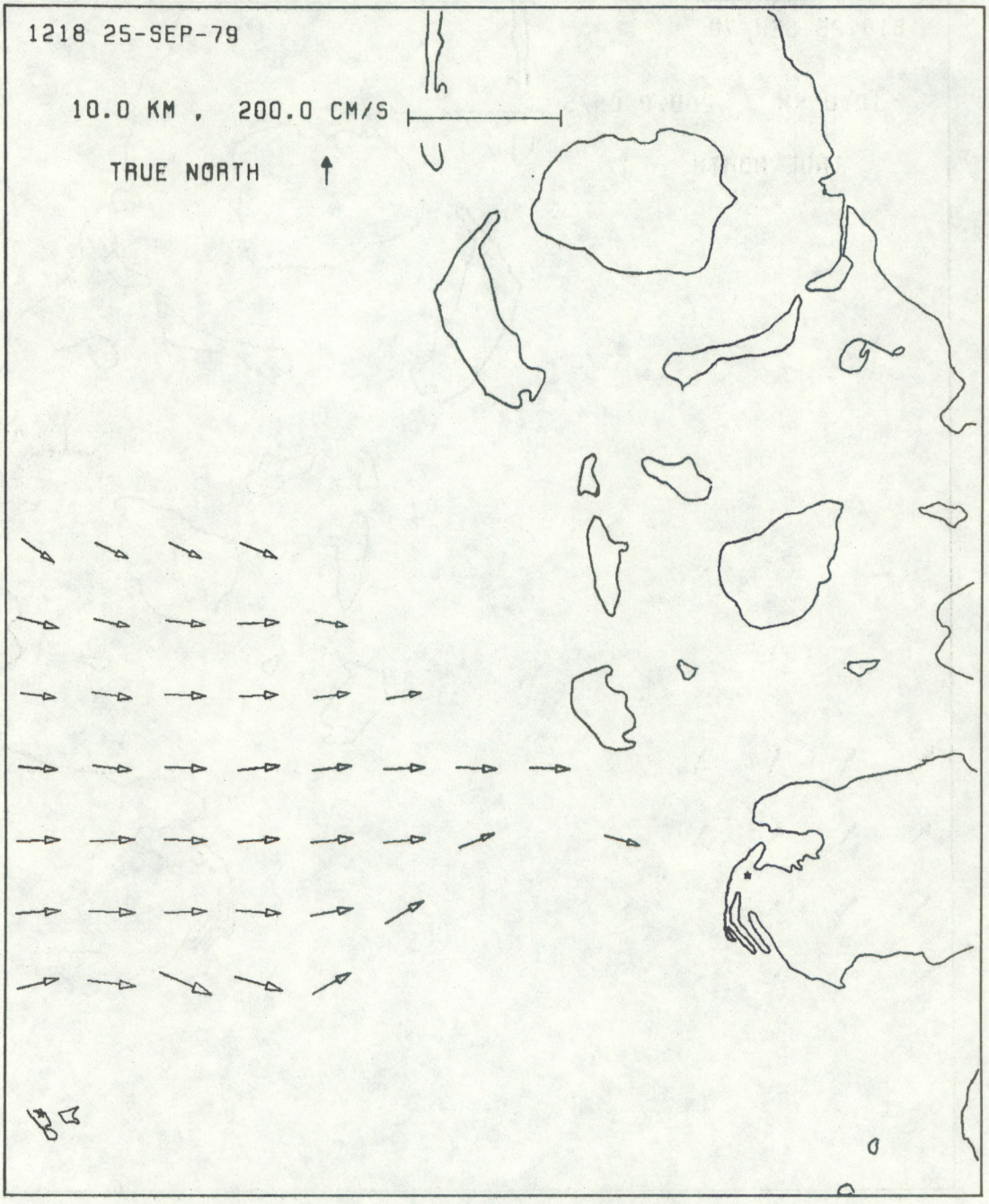

Figure 9.--Surface current vectors at 1218, 25 September 1979.

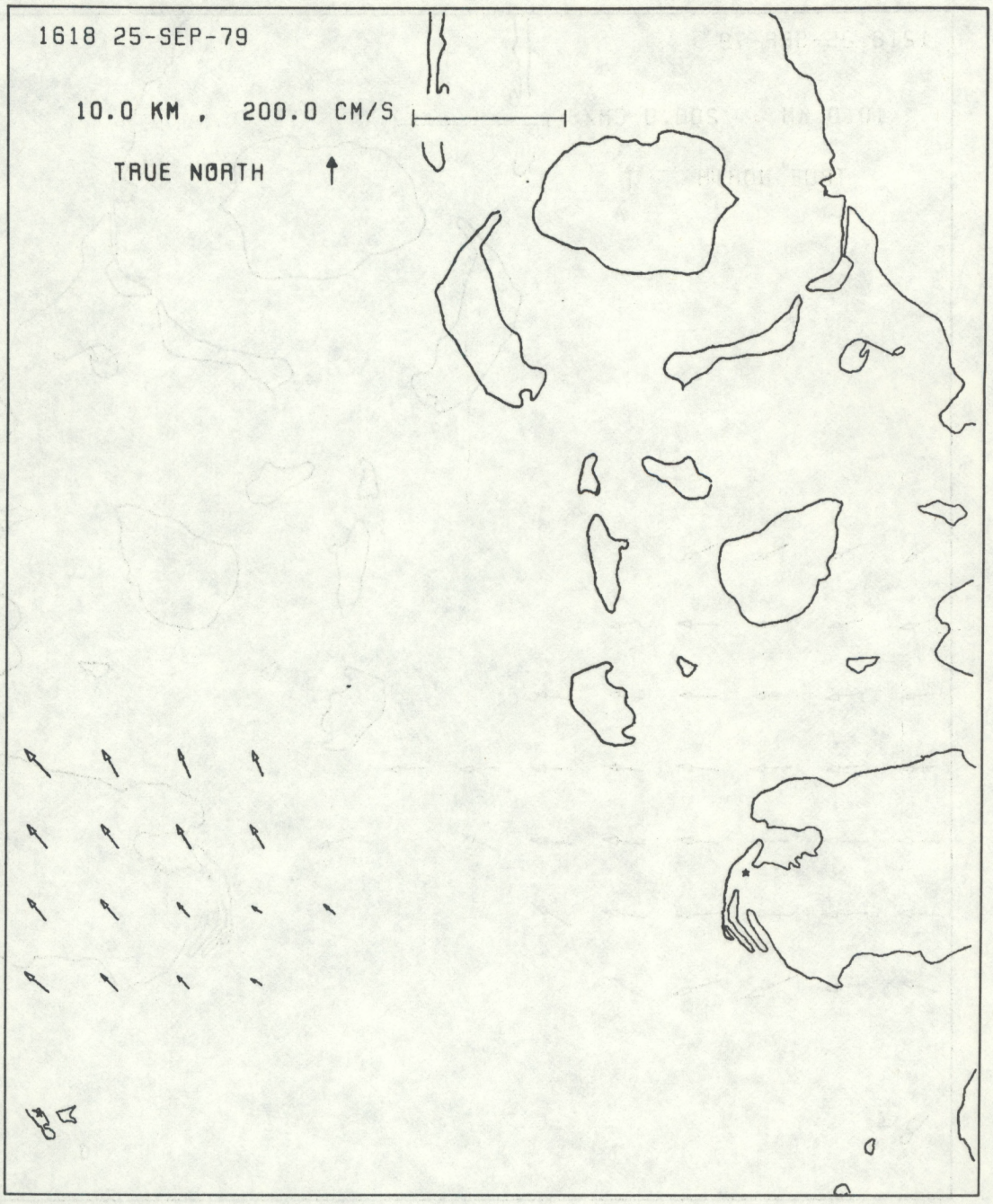

Figure 10.--Surface current vectors at 1618, 25 September 1979.

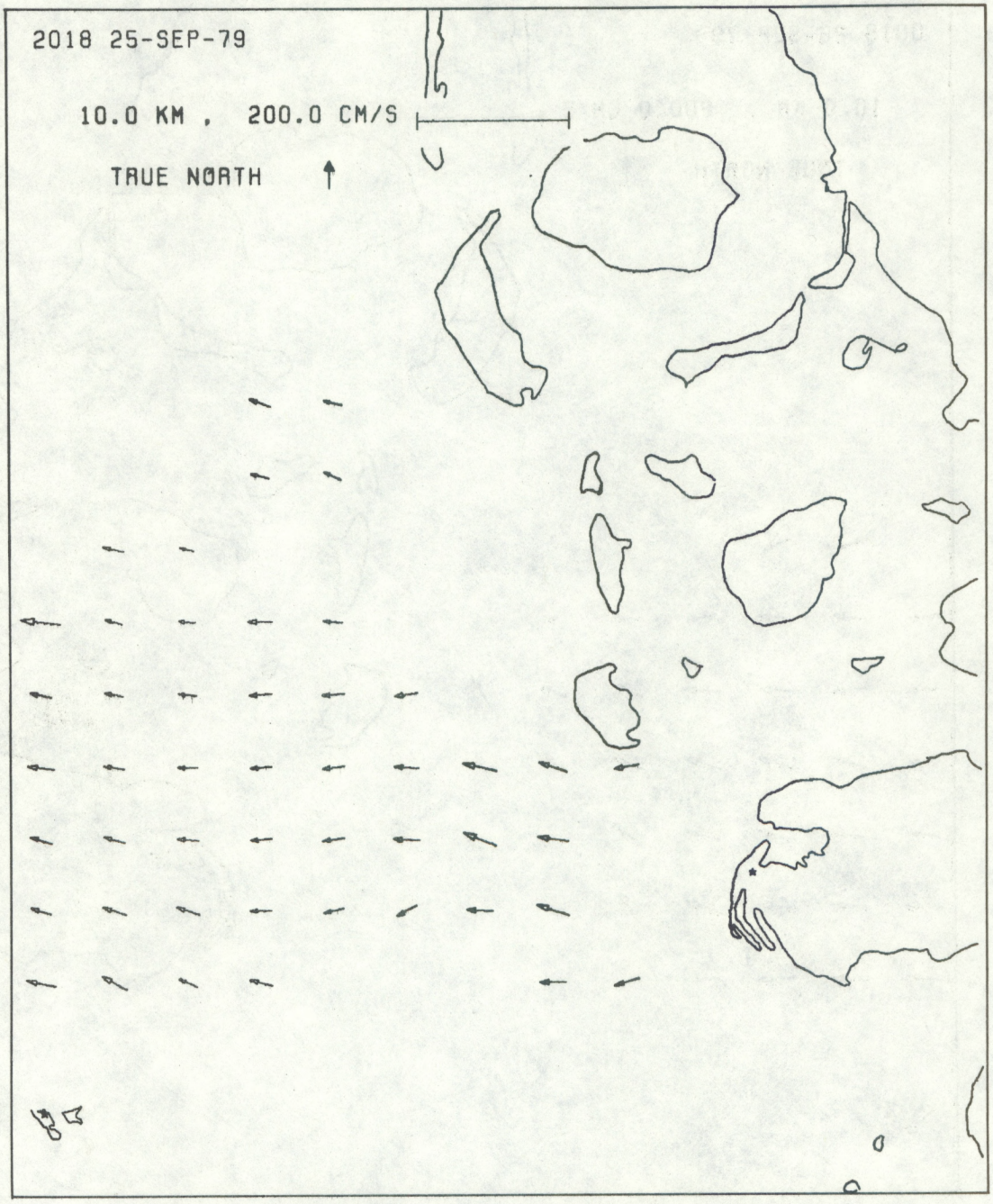

Figure 11.--Surface current vectors at 2018, 25 September 1979.

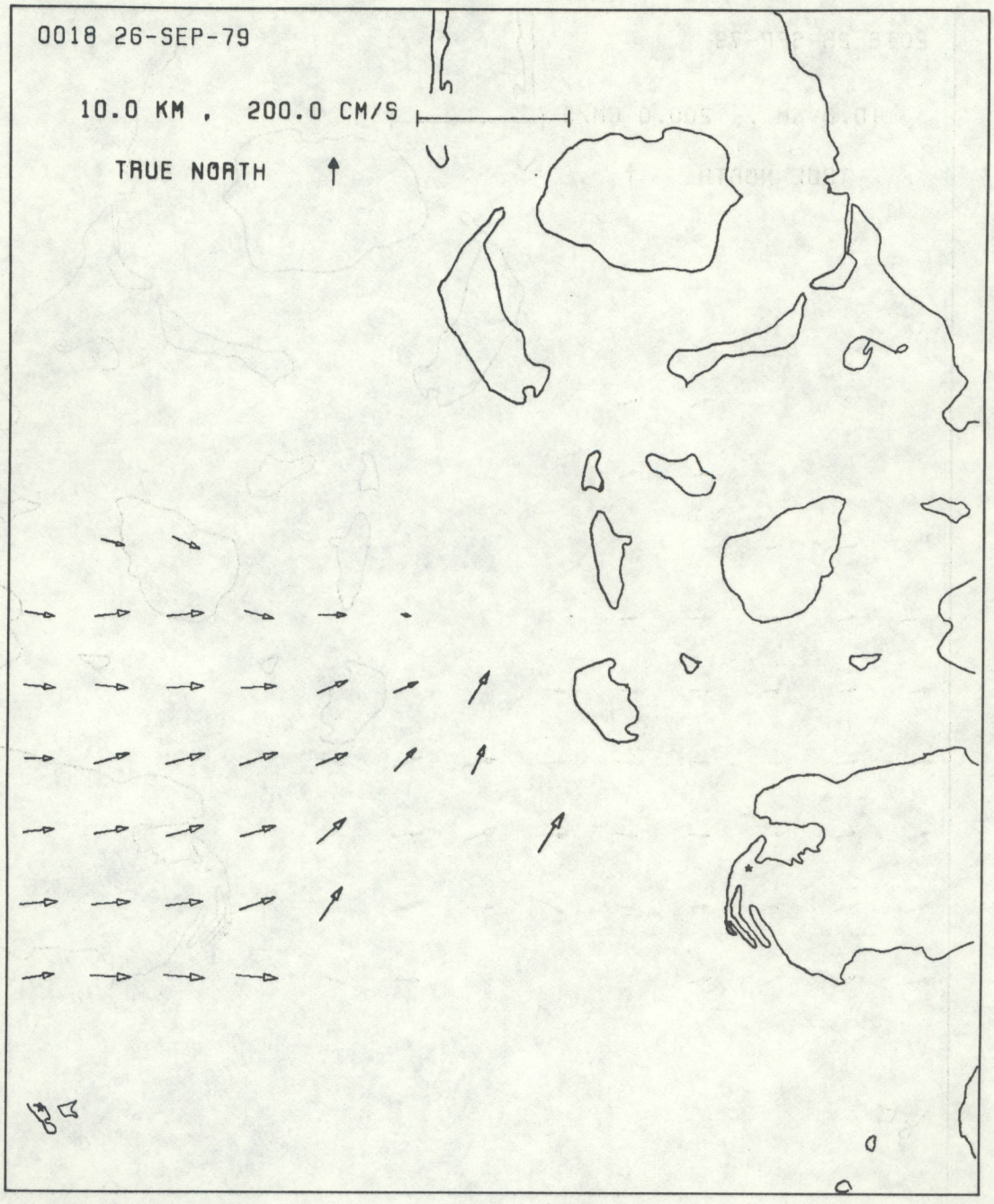

Figure 12.--Surface current vectors at 0018, 26 September 1979.

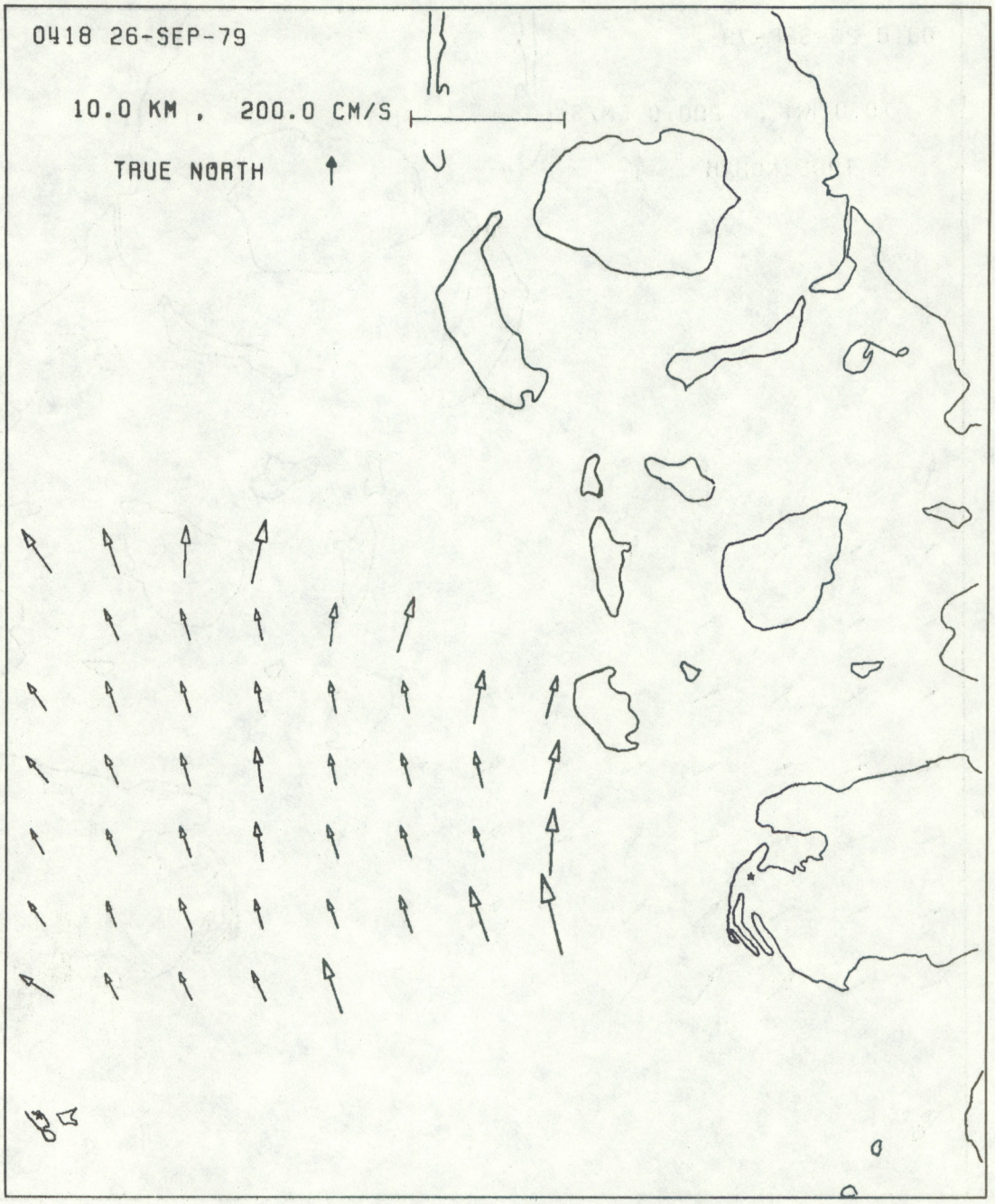

Figure 13.--Surface current vectors at 0418, 26 September 1979.

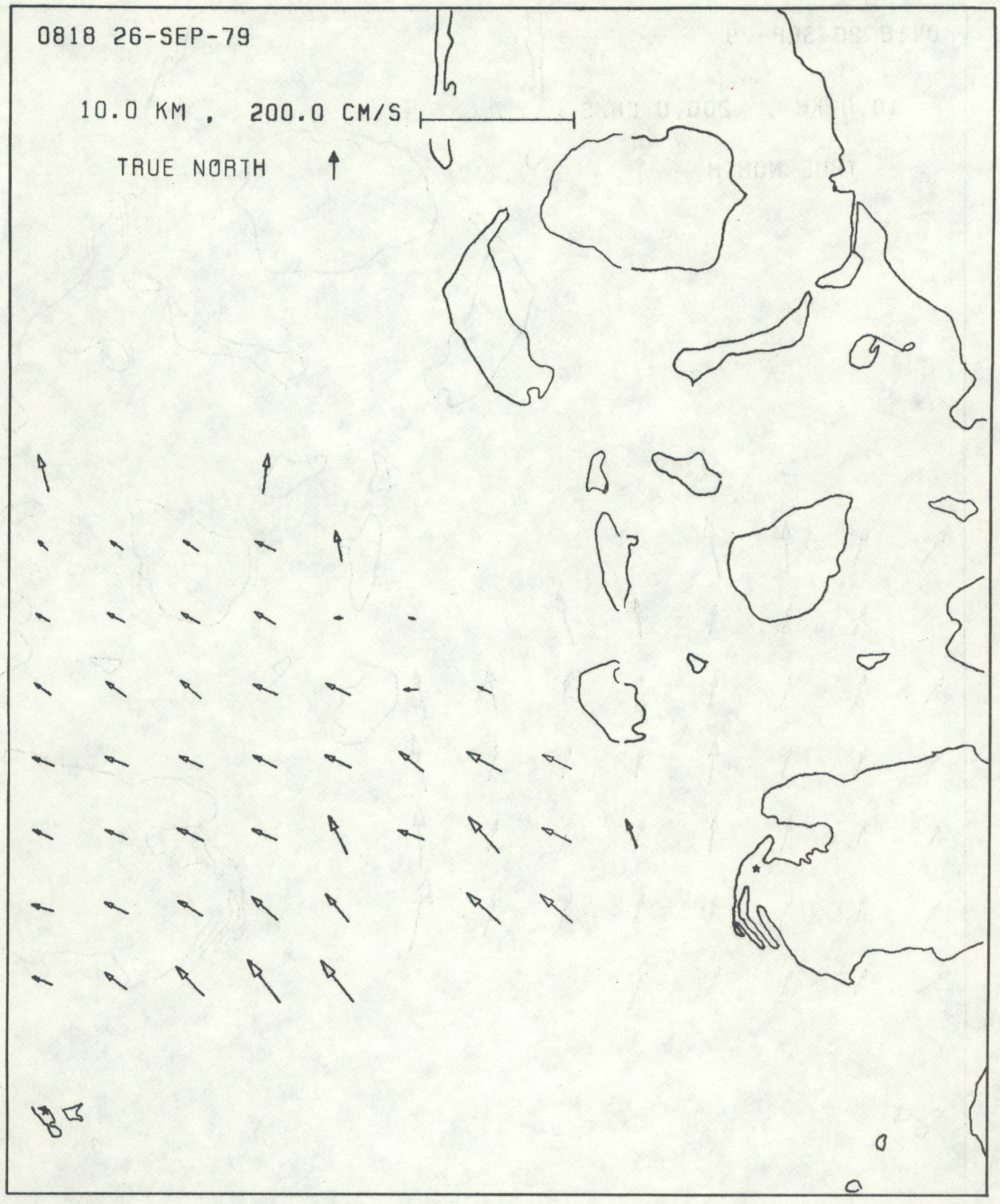

Figure 14.--Surface current vectors at 0818, 26 September 1979.

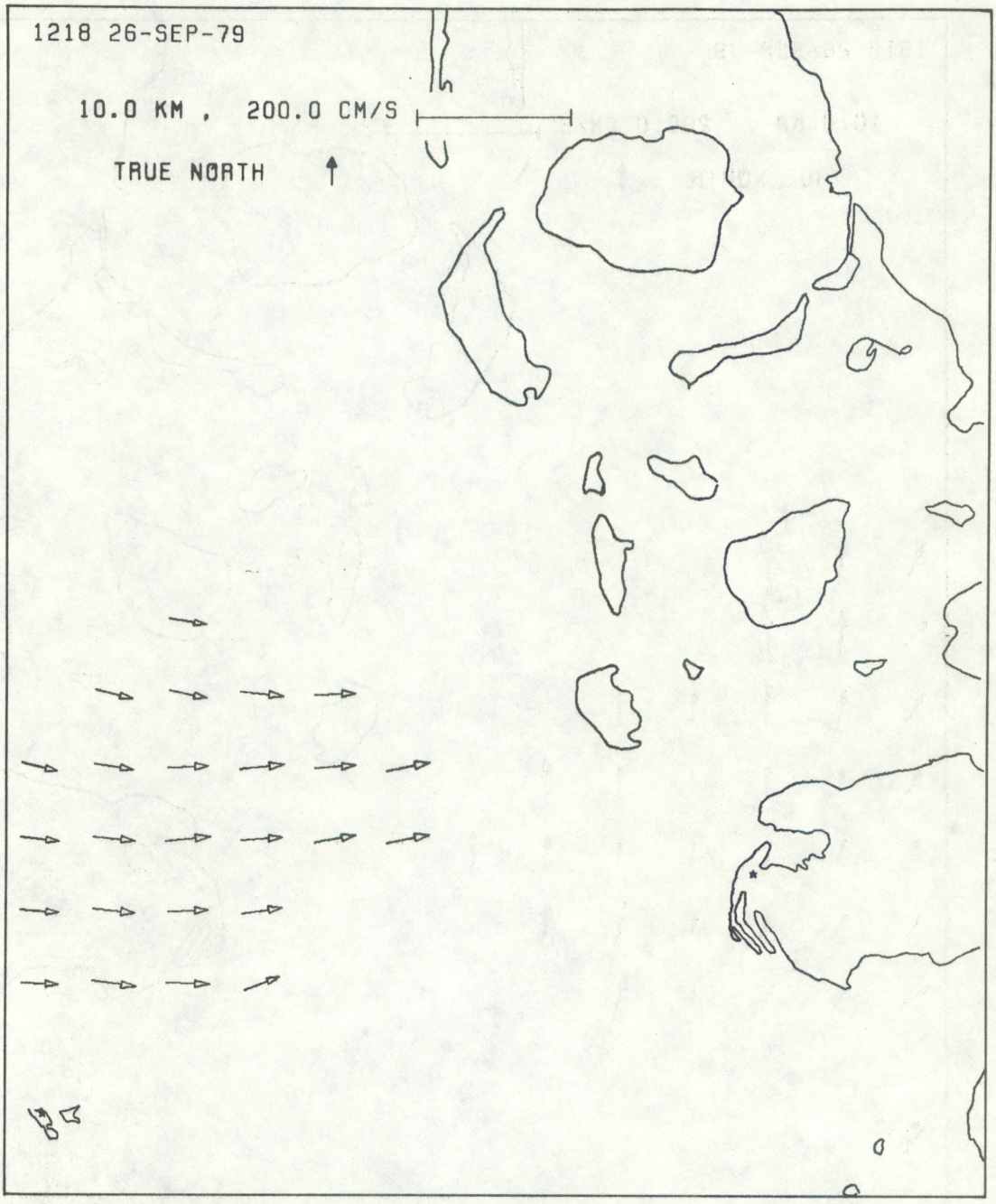

Figure 15.--Surface current vectors at 1218, 26 September 1979.

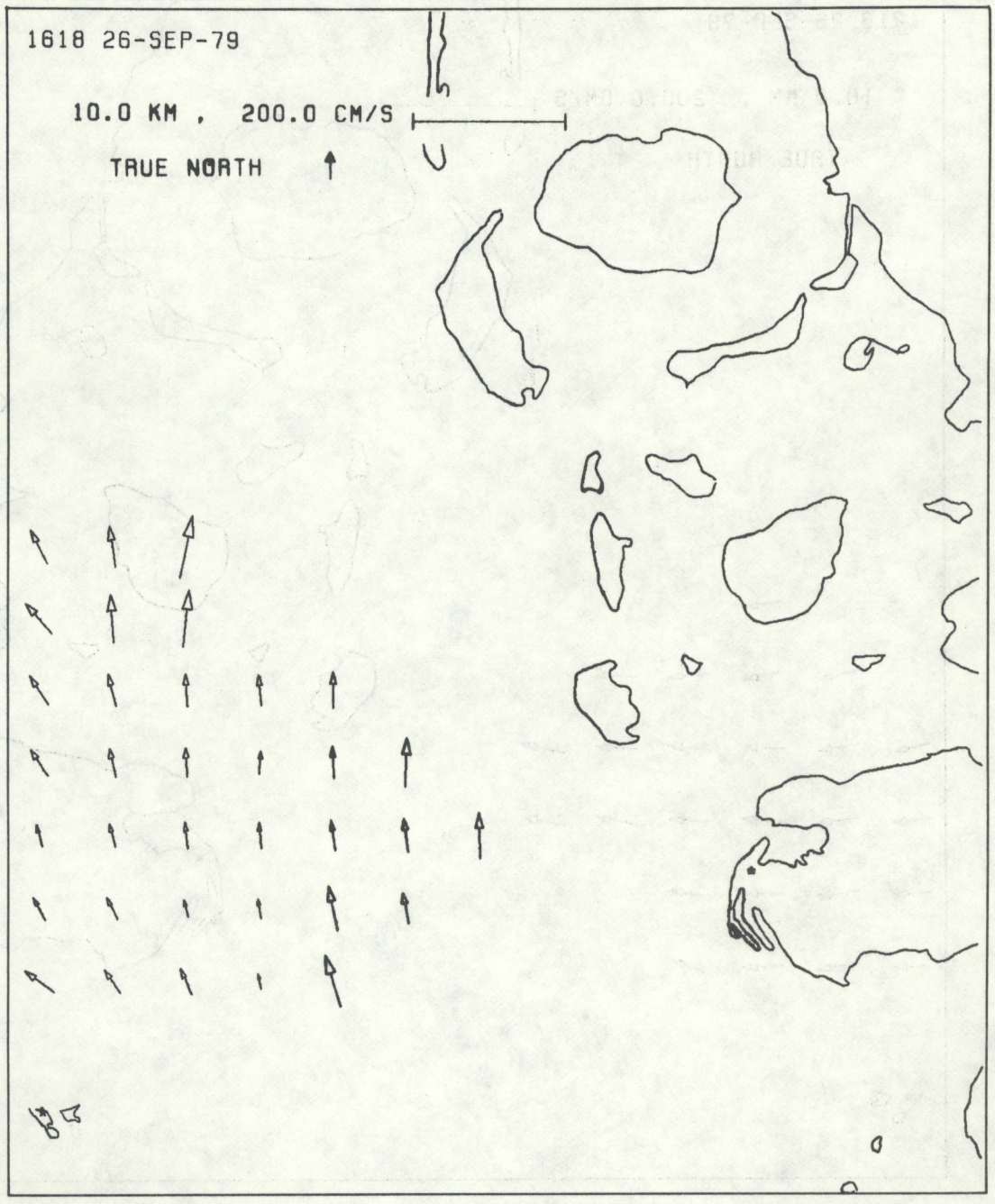

Figure 16.--Surface current vectors at 1618, 26 September 1979.

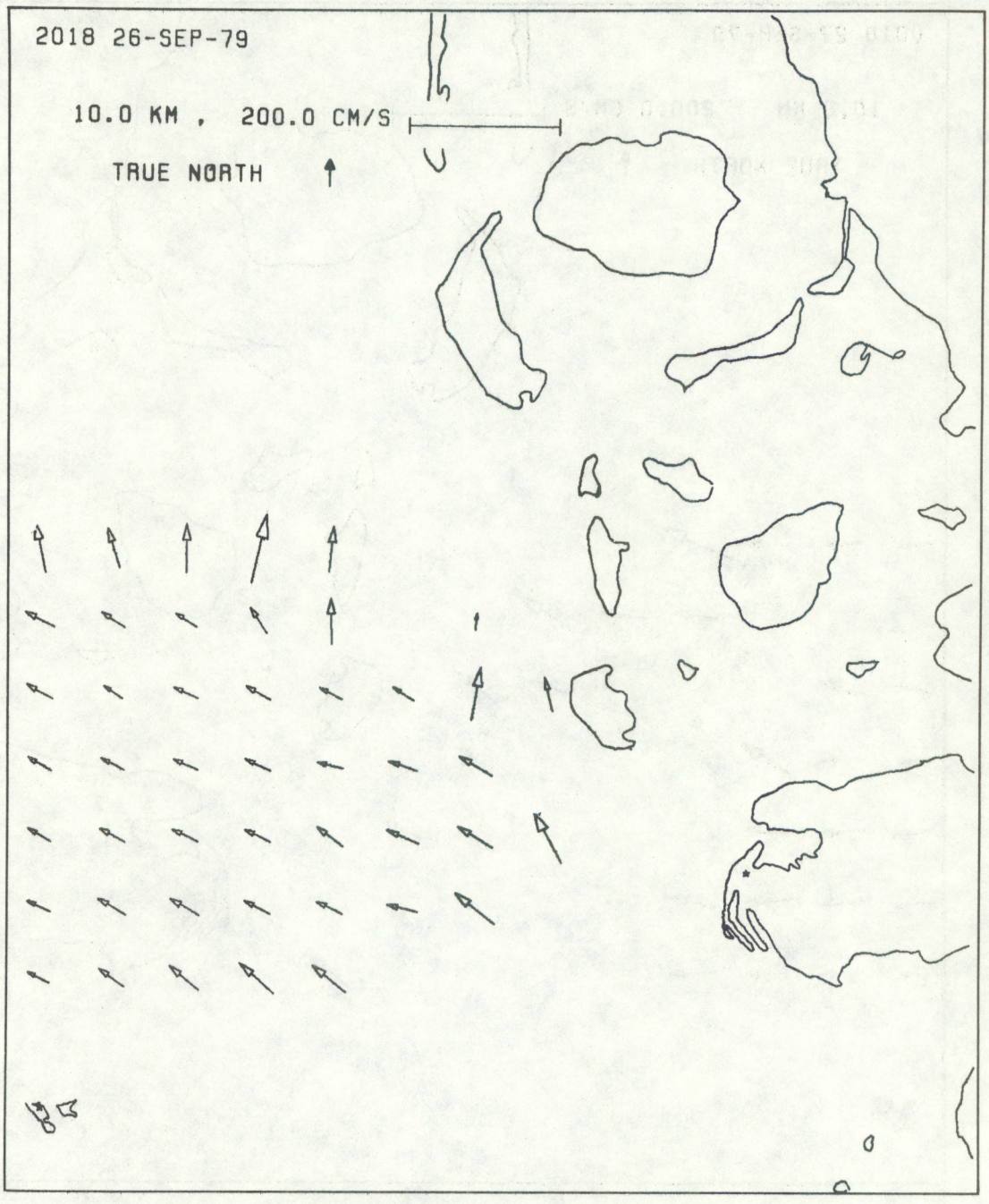

Figure 17.--Surface current vectors at 2018, 26 September 1979.

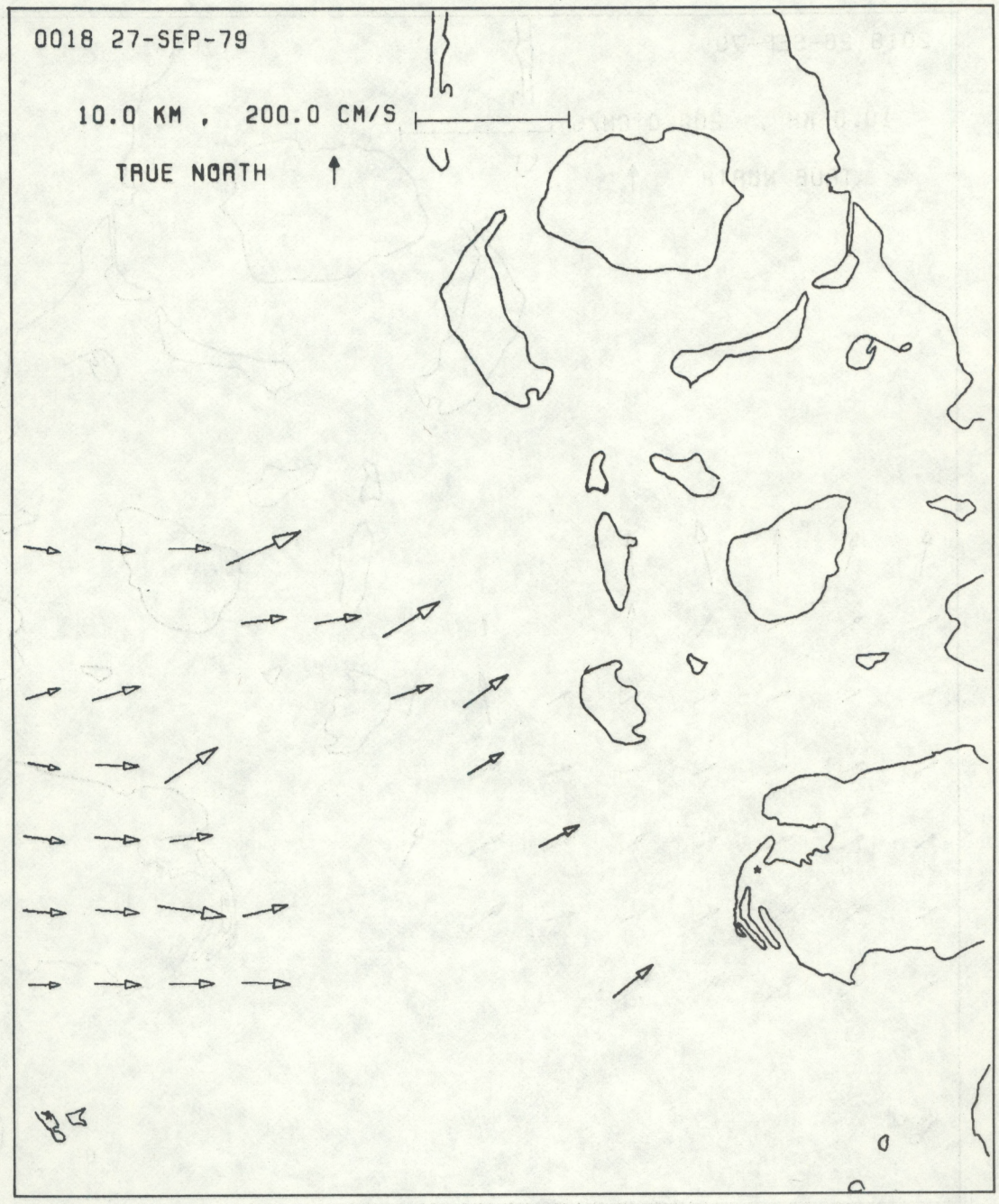

Figure 18.--Surface current vectors at 0018, 27 September 1979.

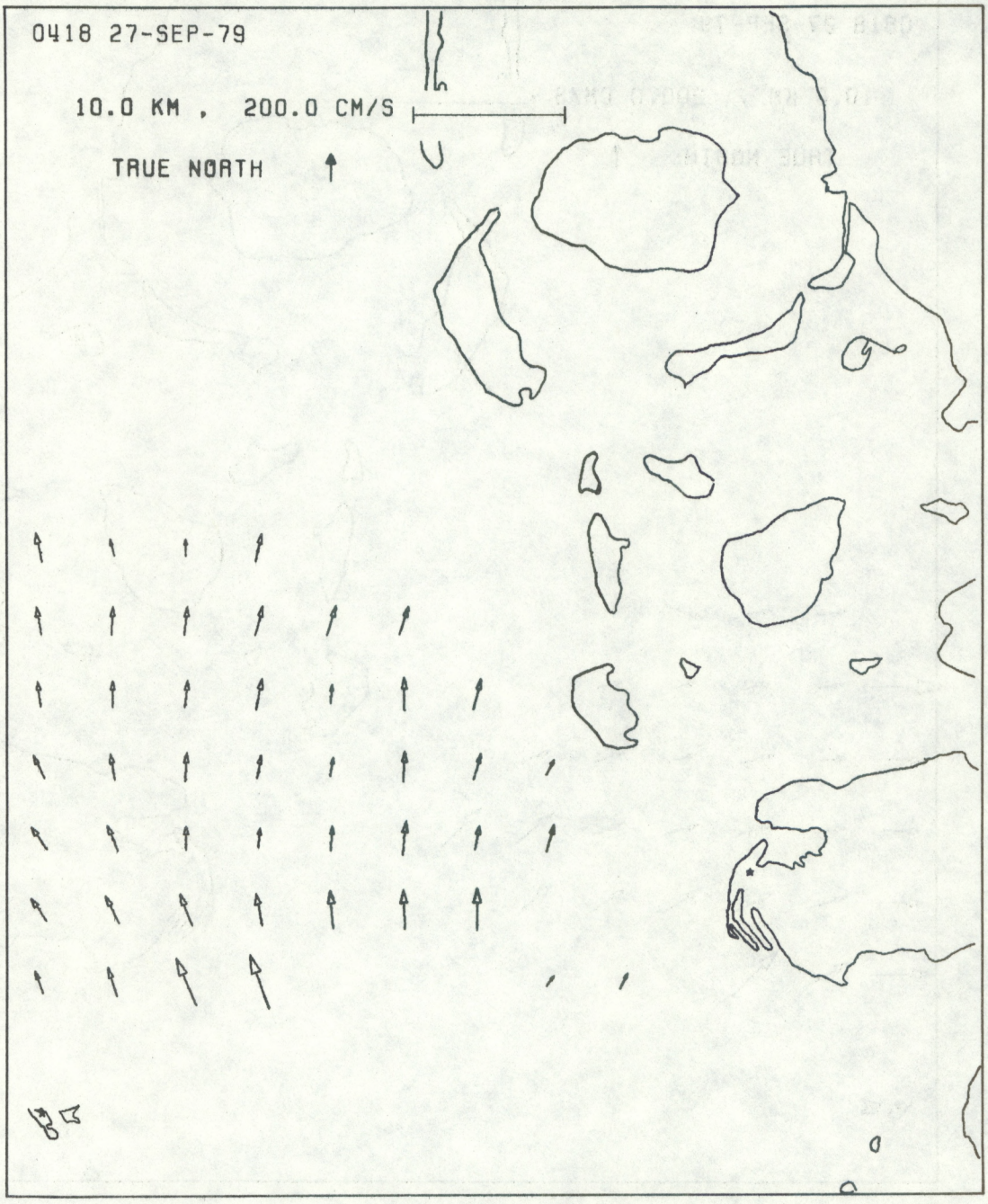

Figure 19.--Surface current vectors at 0418, 27 September 1979.

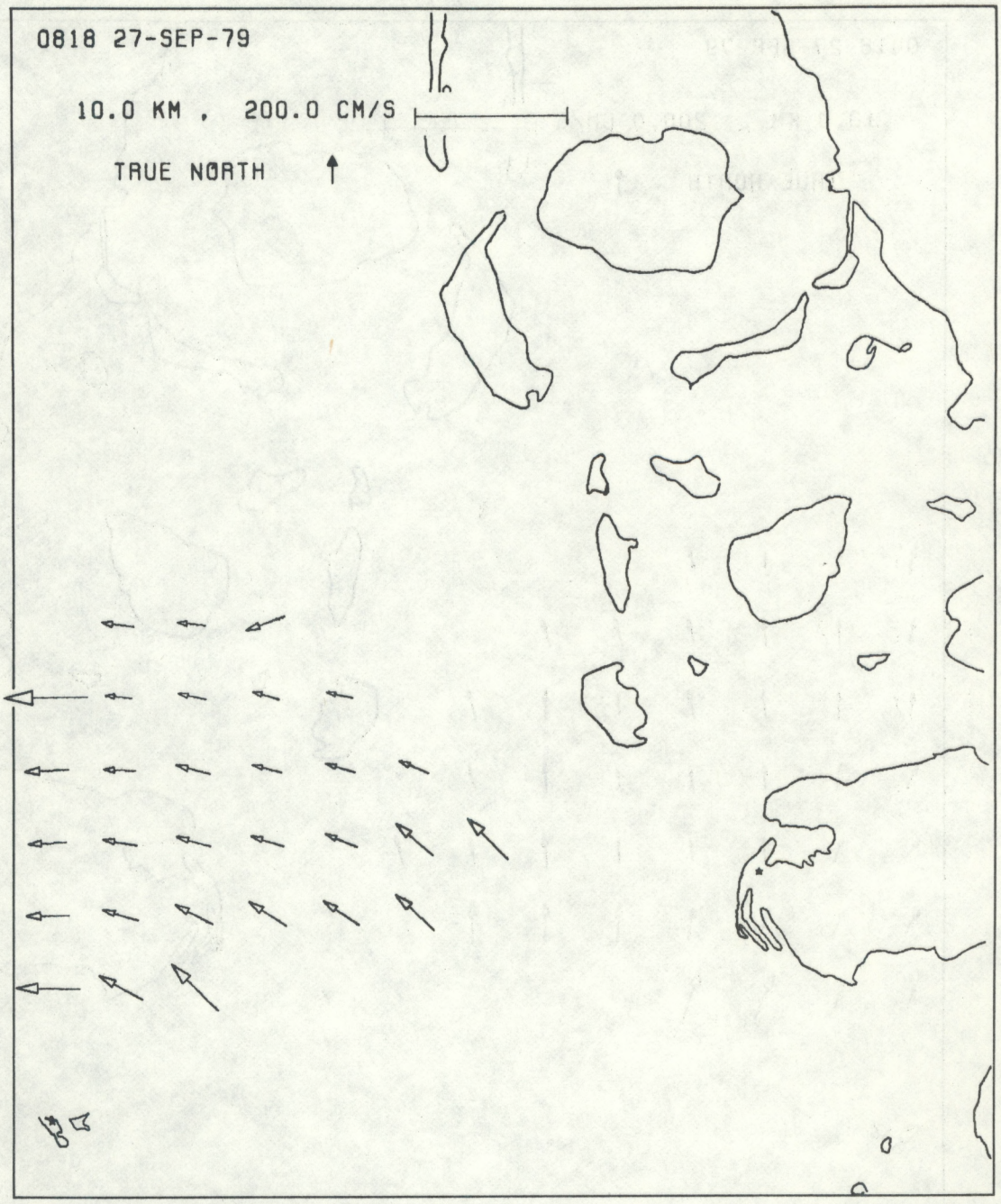

Figure 20.--Surface current vectors at 0818, 27 September 1979.

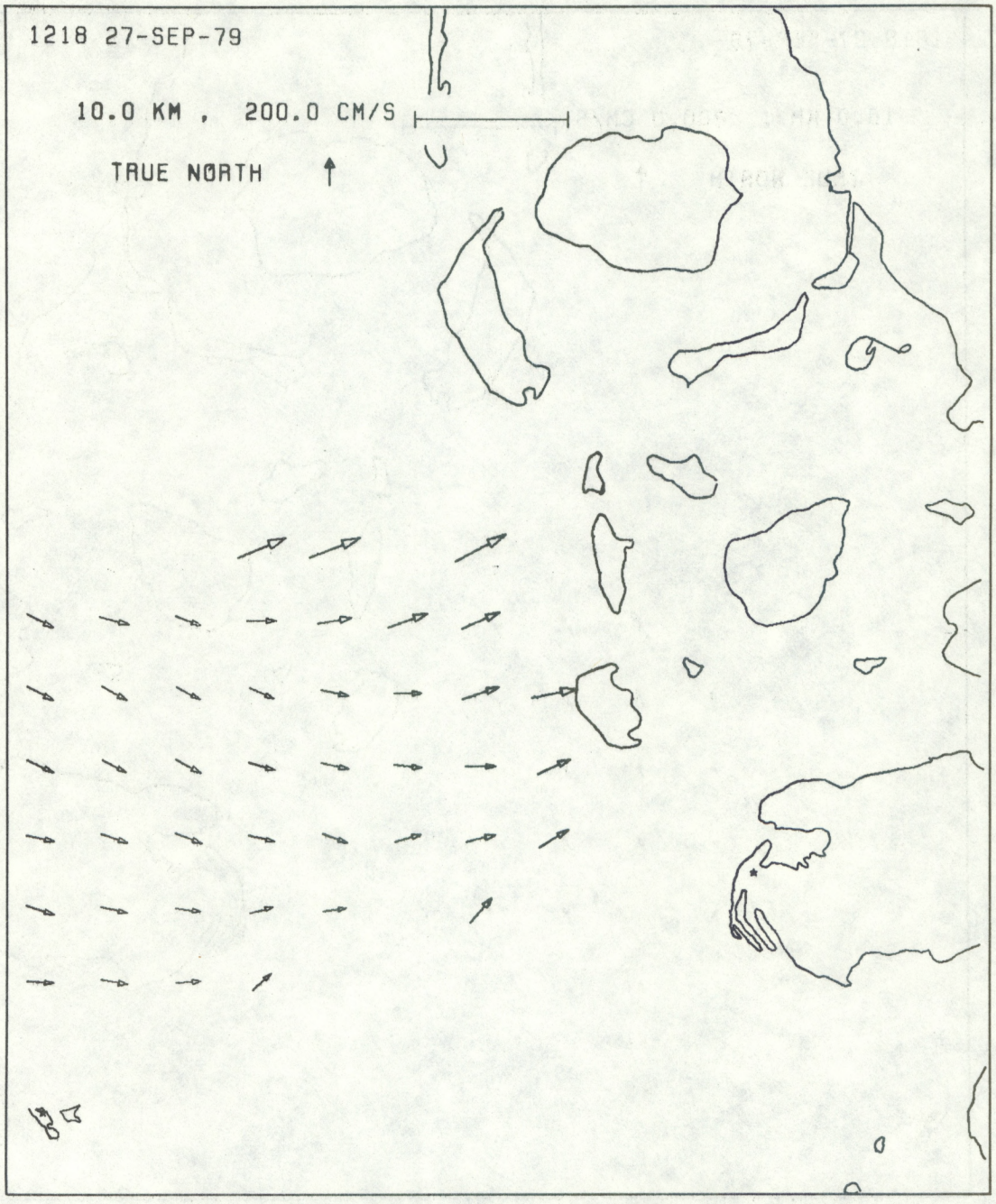

Figure 21.--Surface current vectors at 1218, 27 September 1979.

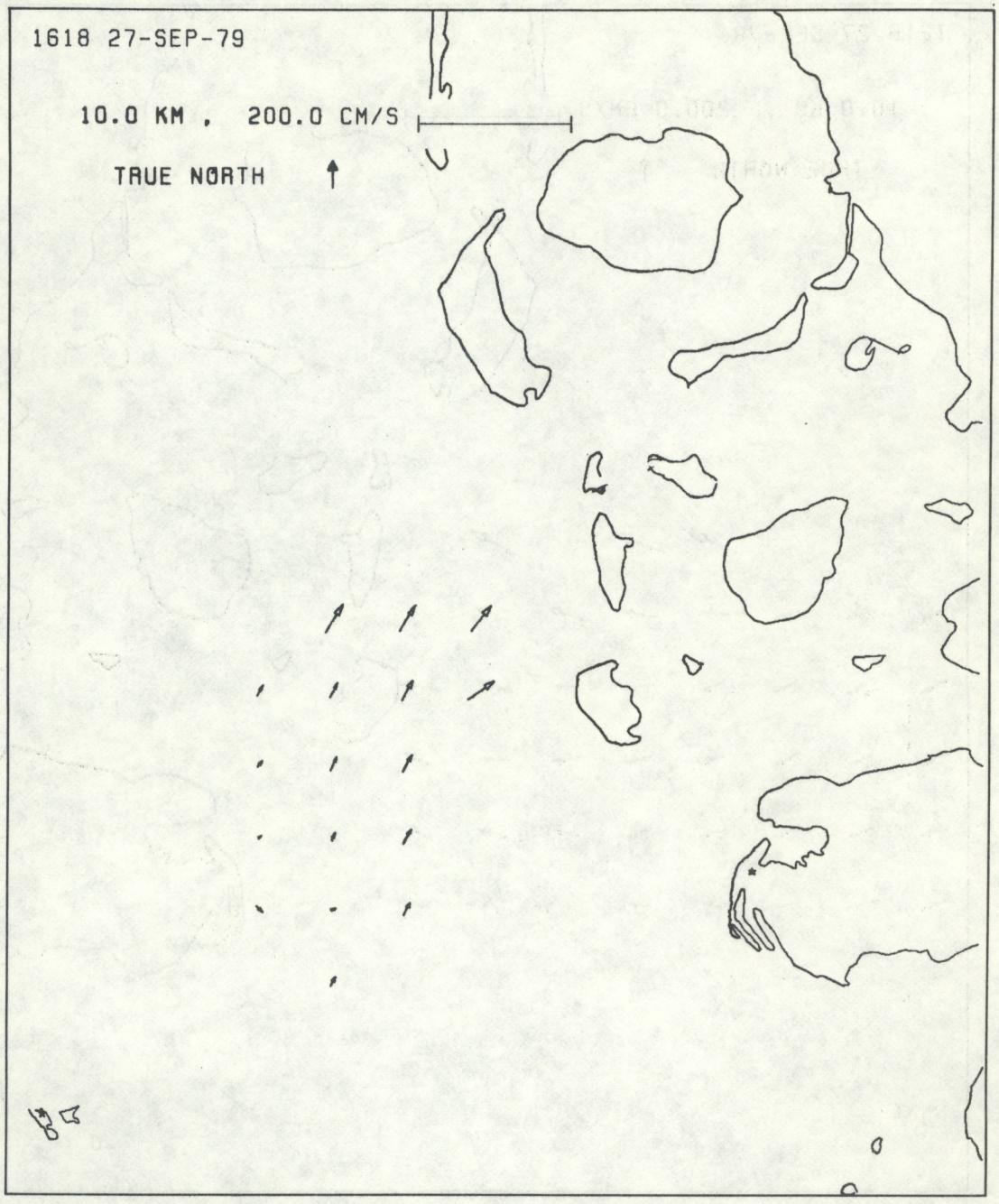

Figure 22.--Surface current vectors at 1618, 27 September 1979.

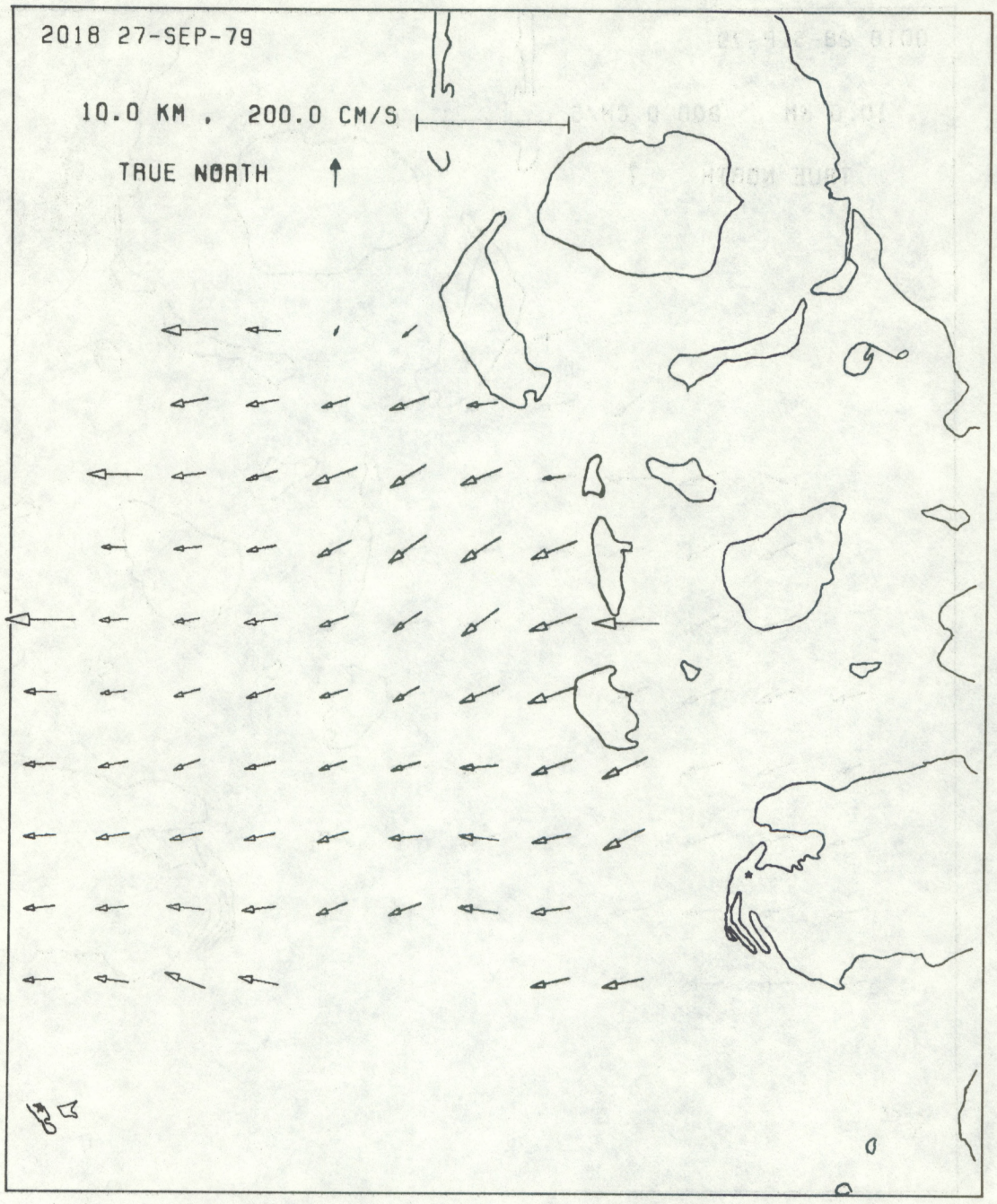

Figure 23.--Surface current vectors at 2018, 27 September 1979.

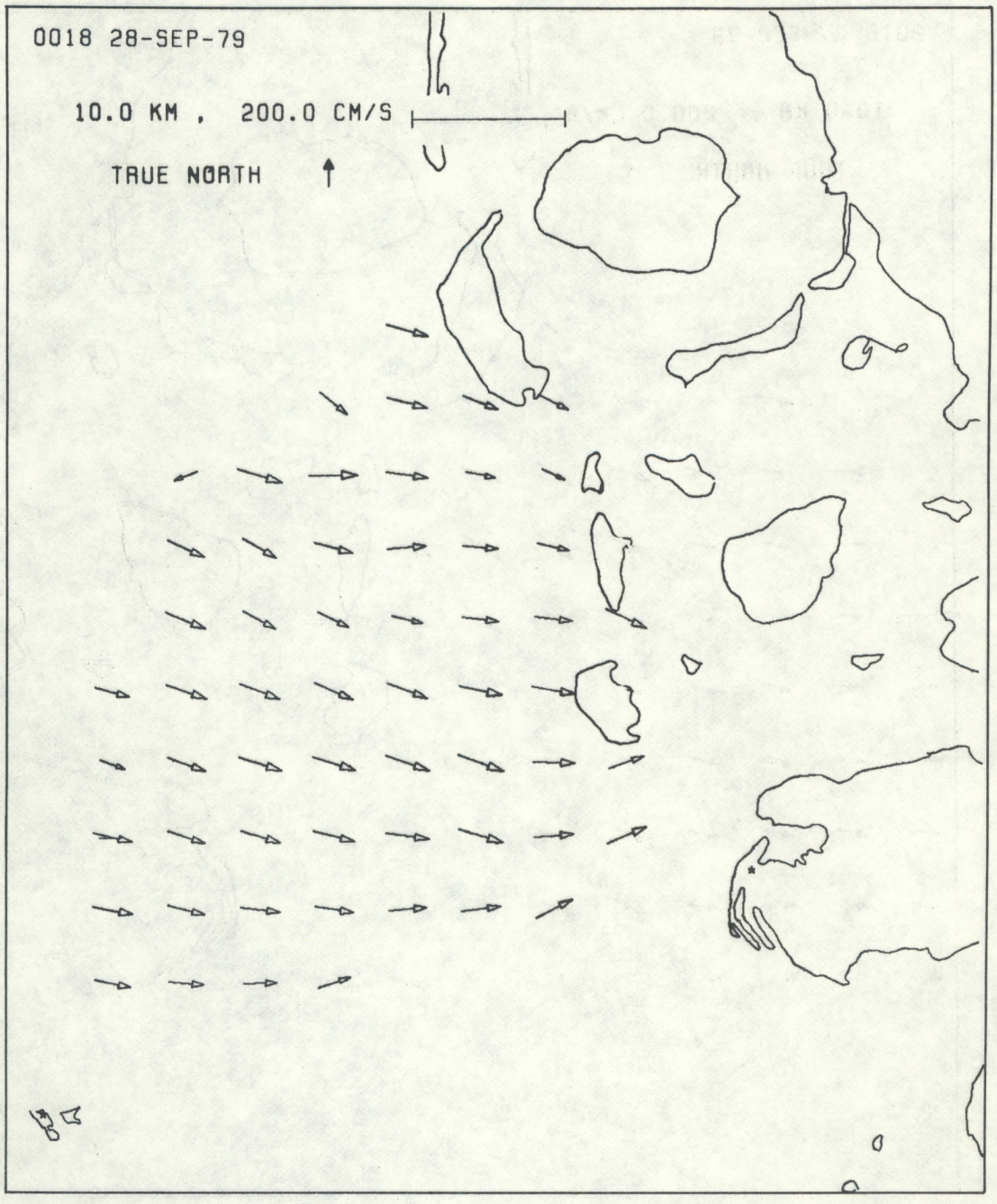

Figure 24.--Surface current vectors at 0018, 28 September 1979.

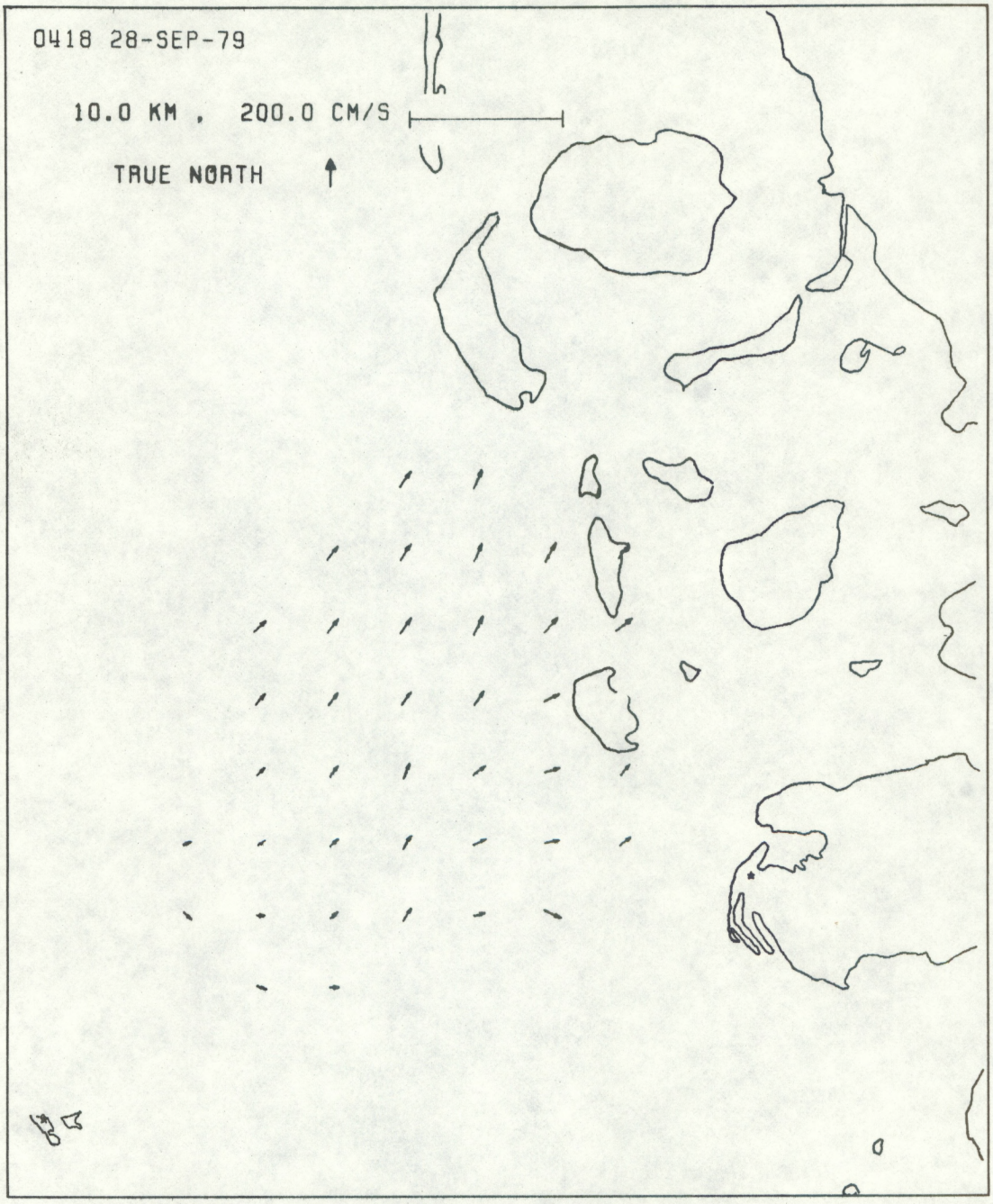

Figure 25.--Surface current vectors at 0418, 28 September 1979.