PACIFIC REGION TECHNICAL NOTES

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Possible Impact of Seasat Data on PWC Marine Forecasts

by

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INTRODUCTION

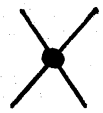
The Seasat satellite was launched on June 28, 1978. On October 10, 1978, Seasat failed in orbit as a result of a massive short circuit in the electrical system. Fortunately, during some three months of orbital operations, the satellite returned a unique and voluminous set of data on the earth's oceans.

This data set is now under evaluation by various groups. Dr. Steve Petaherych of Meteorological Service Research Branch initiated a program for the AES. An invitation to participate was extended to the Pacific, Arctic and Atlantic regions. The first workshop was held at Seattle, Jan. 10-15, 1980.

The operational Seasat system will consist of two polar orbiting satellites. The system was scheduled to be operational in 1985. However, current budgetary restraints by the U.S. Government could cause delays.

NATURE OF THE DATA

The alogarithm used to extract wind speed and direction from the sensor data gives a unique solution for wind speed, but a non-unique solution for wind direction. The data is plotted as follows:



The number 13 represents the wind speed in meters per second. The lines represent the four possible directions.

The analyst must decide which of the four wind direction solutions are correct. The simplest approach seems to be a direct comparison with the conventional data.

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MARINE FORECASTS

The one area of application where the potential impact could be directly assessed is the marine forecasts. When the Seasat swaths were over or just upstream from the Pacific Coasts, a fine resolution wind field could be constructed over the Marine areas. A direct comparison between the Seasat analysis and the Marine forecast could be made.

CASES

Six cases were available, but only two had swaths over the coasts. For these two cases, the marine forecasts that were in effect at the valid time of the satellite data were examined. They were compared with the forecasts that most likely would have been issued if the Seasat data had been available.

When deciding the most likely changes to the forecast, most emphasis was placed on the 0-6 hour period. No consideration was made for changes beyond the 12 hour period.

CASE I - SEPT. 25

1. Forecast Read

   Queen Charlotte Sound;
   Hecate Strait;
   Dixon Entrance;
   West Coast Charlottes;

   Winds E to SE 10-20 except NE 25 knots through some mainland inlets.

2. Possible "amended" Forecast

   Dixon Entrance

   Winds N 15 knots

   Hecate Strait

   Winds NE 20 knots except NE 25 through some mainland inlets.

   Queen Charlotte Sound

   Winds NE 15 knots northern Sector. Light easterlies southern sector.

   West Coast Charlottes

   Winds E to NE 20-25 knots.

3. Comments

   The synoptic situation was slowly evolving. A persistence forecast for the first 12 hours was probably the best approach. The Seasat wind field is found on the following page.

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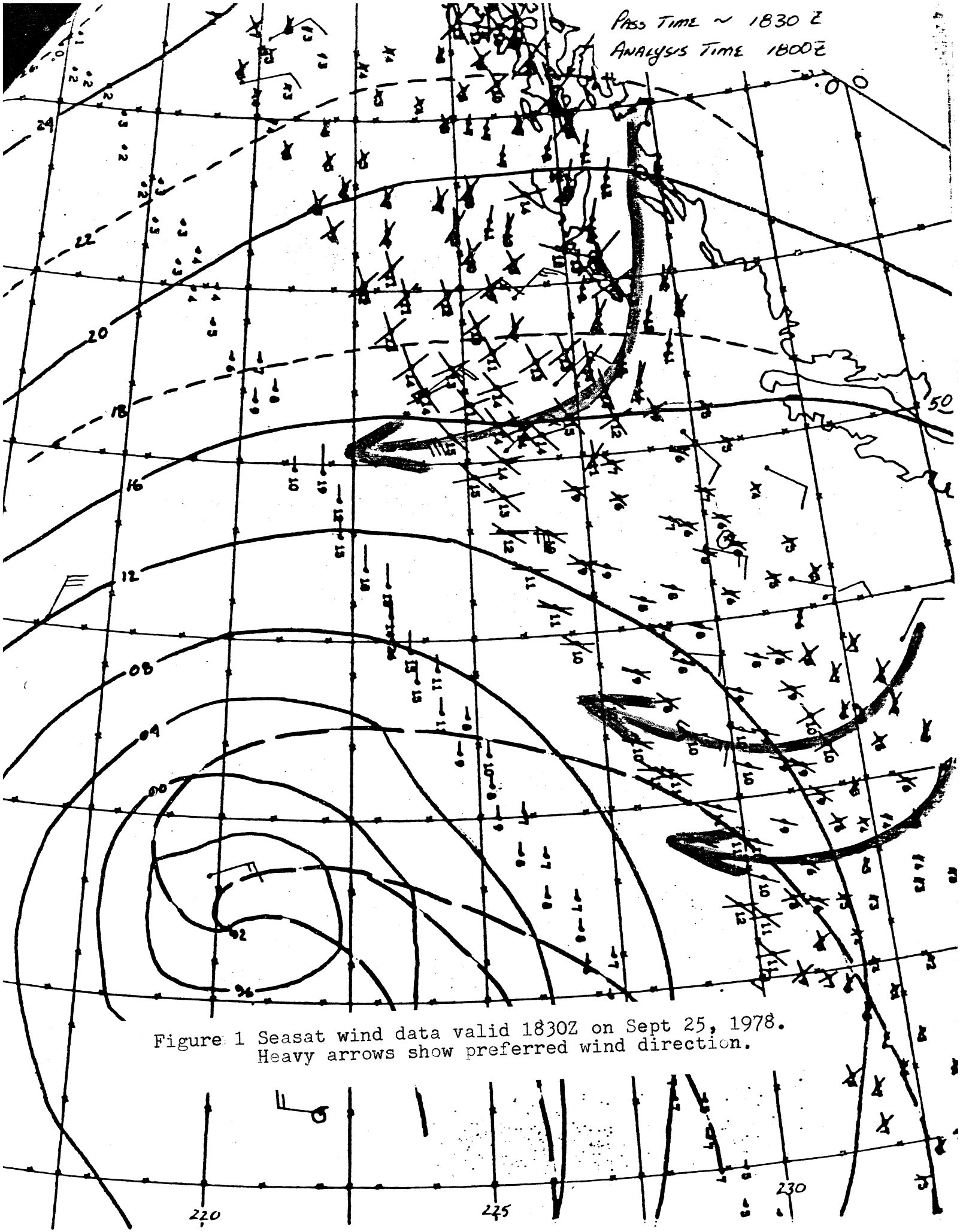

Figure 1 Seasat wind data valid 1830Z on Sept 25, 1978. Heavy arrows show preferred wind direction.

CASE II - SEPT. 19

1. Forecast Read

West Coast Vancouver Island

Gale warning in effect,
Winds SE 25-30 knots northern portions, SE 10 elsewhere. Winds becoming 35-45 knots by evening northern sections and 25-35 southern sections.

Queen Charlotte Sound;
Hecate Strait;
Dixon Entrance;
West Coast Charlottes;

Gale warning in effect,
Winds SE 30-45 knots at times higher abating later today to S 20-30 inner coast and SW 20 to 30 outer.

2. Possible "amended" Forecast

West Coast Vancouver Island

Gale warning in effect,
Winds SE 25-30 northern portions, SE 10 knots elsewhere.
Winds becoming 30-40 northern sections and 25-35 southern section during the afternoon. Winds shifting to W 20 northern sections and W 10 southern sections during the evening.

Queen Charlotte Sound

Gale warning in effect,
Winds SE 30-40 knots becoming W 25-30 by evening.

West Coast Charlottes

Gale warning in effect,
Winds SE 30-40 knots becoming SE 25-30 during mid-afternoon.

Hecate Strait

Gale warning in effect,
Winds SE 30-40 knots becoming SW 25-30 by evening.

Dixon Entrance

Gale warning in effect,
Winds SE 30-40 knots becoming W 25-30 during mid-afternoon.

3. Comments

The Seasat data revealed the presence of a secondary shear line approaching the north coasts. The major windshift is associated with this shear line. The PWC analysis showed the "TROWAL" further east. The PWC marine forecast called for a gradual change in wind speed and direction. The Seasat wind data would show an abrupt change is likely.

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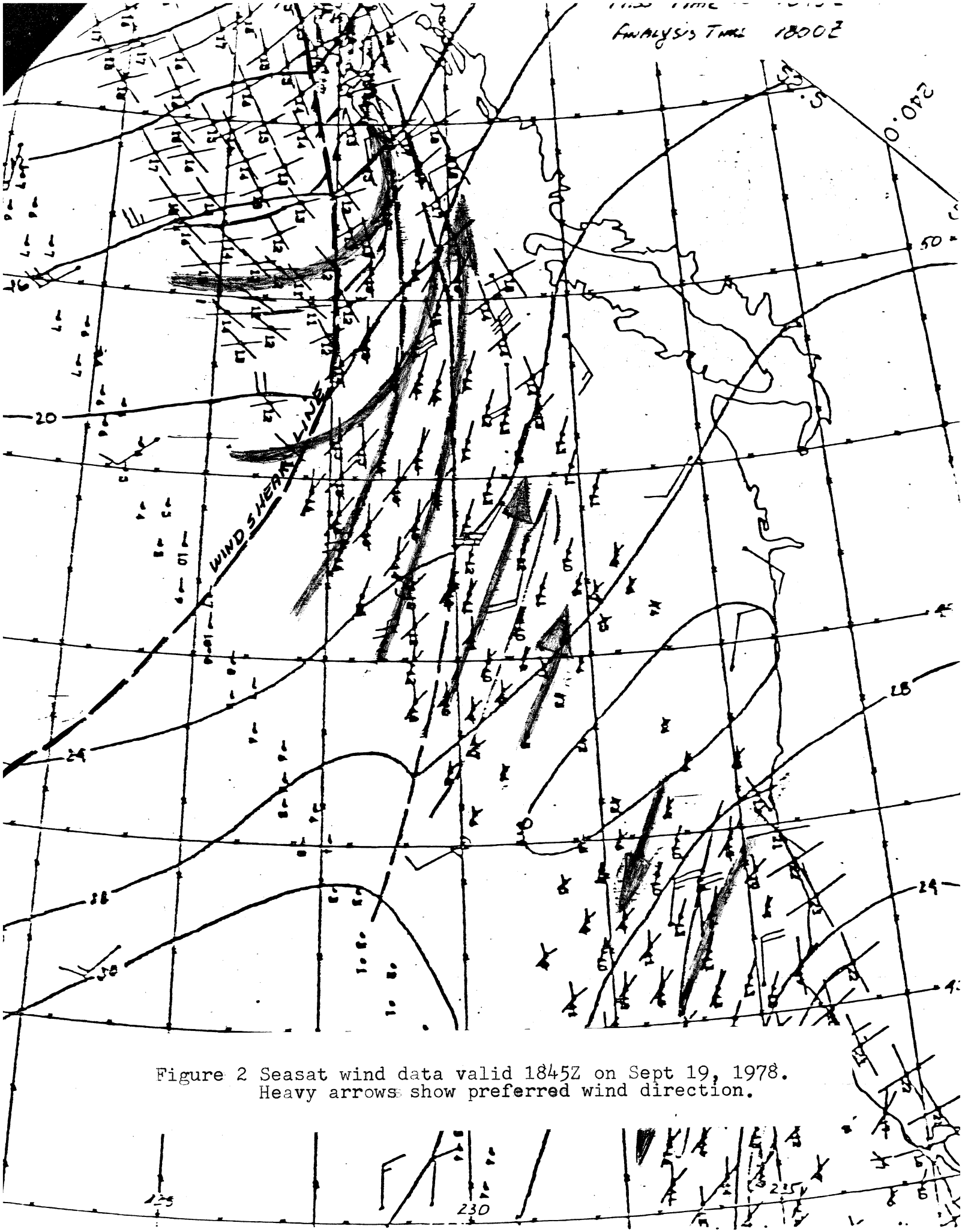

Figure 2 Seasat wind data valid 1845Z on Sept 19, 1978. Heavy arrows show preferred wind direction.

TENTATIVE CONCLUSIONS

The Seasat data could have significant impact on the PWC marine forecasts because:

1. The fine resolution wind data over or near the area of responsibility would result in greater sensitivity of a forecast within a region;

2. There would be less tendency to average over several regions;

3. The range used in the forecast would be decreased;

4. Because of 2, 3 and 4, the number of regions could be increased;

5. The ability to resolve mesoscale and subsynoptic scale features over or near the area of responsibility would result in more accurate timing and forecasts in the 0-12 hour period.