

U.S. Geological Survey  
Alaska Division  
Fairbanks, Alaska

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REPORTED OBSERVATIONS OF

ICEBERGS FROM COLUMBIA GLACIER

IN VALDEZ ARM AND COLUMBIA BAY, ALASKA, DURING THE SUMMER OF 1976

Twain

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Data on frequency, distribution, and size of icebergs\* produced by Columbia Glacier were obtained during the summer of 1976. These data were recorded in Columbia Bay and Valdez Arm for the U.S. Geological Survey by officers of two vessels plying between Valdez and Whittier, and occasionally between Valdez and Cordova, Alaska. The Prince William Sound Navigation Co. MV Glacier Queen obtained data from June 8 to September 5; the Alaska Marine Highways Systems ferry MV E. L. Bartlett made observations between July 2 and September 4. Officers of these vessels utilized visual observations augmented by radar in determining the position, density, and size of the floating ice fragments. Records were generally obtained twice daily by both vessels and recorded on a standard form provided by the Geological Survey (fig. 1). East bound, these vessels normally navigated the passage north of Glacier Island, entered Columbia Bay, and then proceeded on to Valdez by way of Valdez Arm; the return voyage followed the same general route in a reverse direction. Occasionally, the vessels were forced to go south of the island because of concentrated ice north of Glacier Island. A composite map (fig. 2) shows areas where icebergs were observed.

\*The term iceberg as used here refers to all pieces of glacier ice large enough to be readily observed by radar or visual observation. Many of those indicated as rectangles on the daily maps (fig. 1) or those which defined the area of coarse stippling on the composite map (fig. 2) fit the definition of iceberg, as they were appreciably larger than 100 m<sup>2</sup> in area; most of the other ice masses are properly referred to as "berg bits" or "growlers".

These observations do not form a complete, continuous, or uniform record, even in the areas most often navigated<sup>1</sup>. Particularly limited are observations of iceberg drift south into the open waters of Prince William Sound. However, from the notes written on the reporting sheets it seems that only rarely did icebergs drift beyond the area in which they are shown in figure 2.

Figure 3 shows the maximum extent of the iceberg plume on each day. This graph also shows the dates on which ice was observed in Valdez Arm, and on which ice was observed in, or extending across, the steamer lanes (for location of steamer lanes, see figure 2). Icebergs drifting into Valdez Arm were observed on 40 of the 90 days on which observations were made; on 23 days the ice extended into or across the steamer lanes.

These records, augmented by periodic aerial photos of the glacier's terminus, suggest that the volume and size of icebergs in the shipping lanes at any time are related, in decreasing order of importance, to: (a) the quantity of ice being discharged by the glacier only hours, or at the most days, prior to the observation, (b) currents carrying the ice out of Columbia Bay east of Glacier Island, and (c) the occurrence of calm conditions, or less frequently, winds from the northeast.

The records demonstrate rapid changes in the volume and extent of icebergs. The small icebergs presently discharged by Columbia Glacier do not normally survive long in these waters, due to their size (under 10 m) and the relative warmth of the saltwater. The largest iceberg noted in Columbia Bay was about 100 m in length; this probably broke up rapidly, for it was recorded only once. A few of the larger bergs were distinctive enough to be recognized for several days. However, if Columbia Glacier were to begin drastic retreat, many of the resulting icebergs would be larger and might persist far longer.

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<sup>1</sup>Because fog (and occasional severe storms) limited visibility on many days.

As shown in figure 3, ice was always present in Columbia Bay; in the waters north of Glacier Island icebergs were always present after June 25 to the end of observations. Icebergs were first observed drifting into Valdez Arm on July 6 and were in those waters approximately half the remaining time.

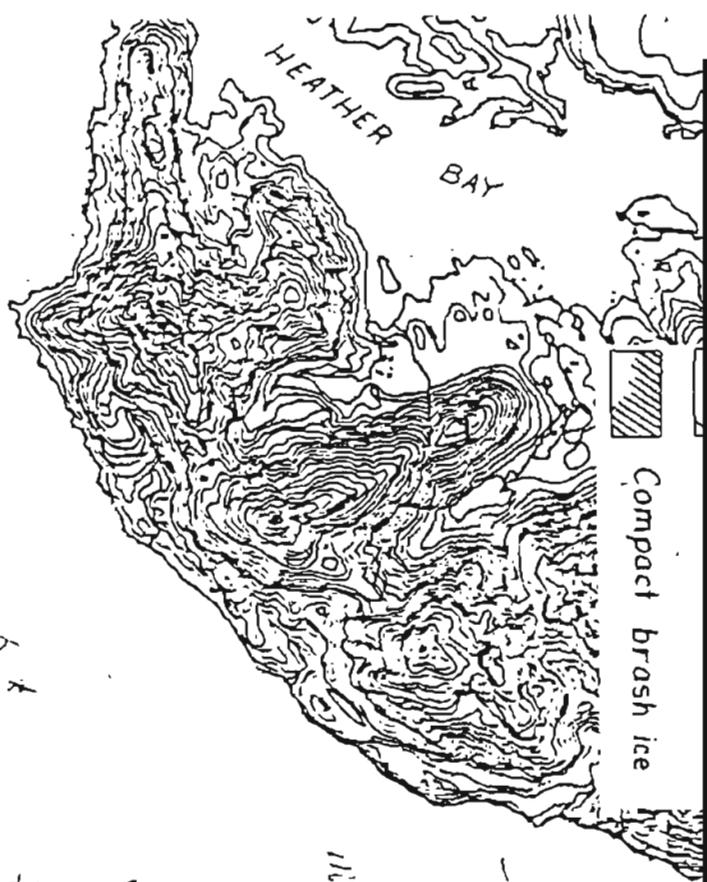
The data from which this report is compiled were collected voluntarily and without compensation by the officers of the two vessels. The ships' masters and the officers making most of the observations, Scott Kimball of the Glacier Queen, and F. M. Soucie of the E. L. Bartlett, are particularly thanked for their interest.

Figure 1. U. S. Geological Survey iceberg distribution recording form as filled out by F. M. Soucie of the MV E. L. Bartlett at 0930 hours, August 5, 1976, enroute from Valdez to Cordova (ship's course shown by line with arrows) shows the maximum eastern and southern extent of the icebergs noted in Valdez Arm during the summer of 1976.

Figure 2. Map showing areas where icebergs were reported June 8-September 5, 1976. This is a composite of all daily maps; at no time did icebergs extend over the whole area shown. On the other hand, icebergs may have existed in other areas but were not observed by the two vessels reporting.

Figure 3. Distance from Columbia Glacier reached by iceberg plumes each day from June 8-September 5, 1976. Those days in which icebergs were observed in, or had crossed, the designated steamer lanes are indicated with an asterisk.

Compact brash ice



HEATHER BAY

Ice observed

as on voyage  
- low visibility, marked

from Radar  
observations when  
night had 105 mi

COVERTLES

R 0317 -6  
V 0756 9.0  
1509 4.0

Ice extends  
0.5 chair @ 105 mi  
South of 06 22 mi  
SE

Busby Isl.

TATITLEX

GALENA BAY

WEST BAY

NARROW



BLIGH ISLAND

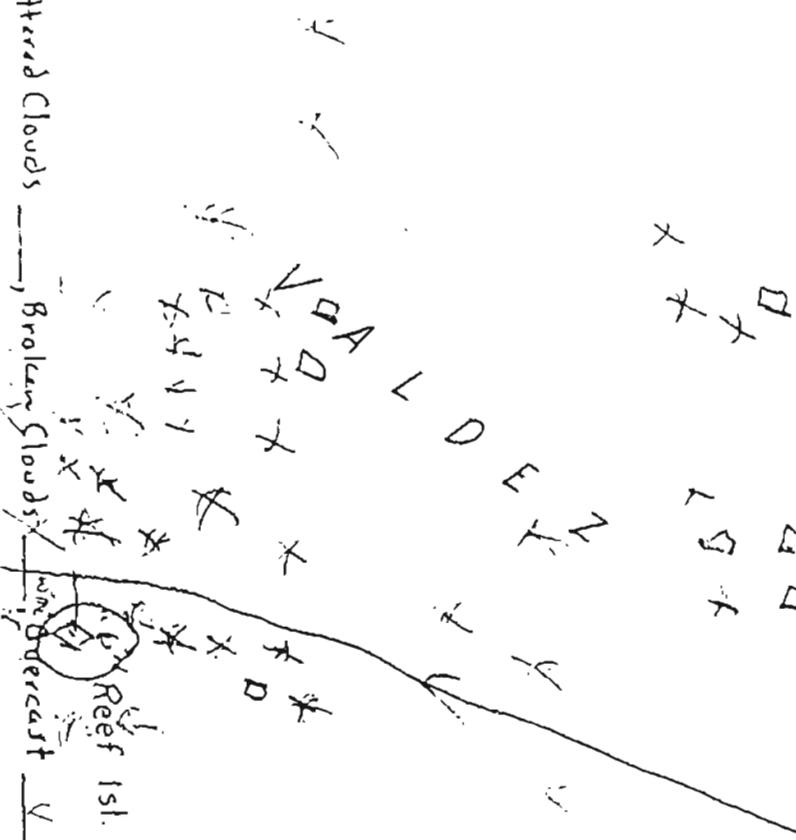
Altered Clouds ---, Breaking Clouds \*

Overcast V

Showers X

Rain X

Snow ---



Reef Isl.

Figure 1

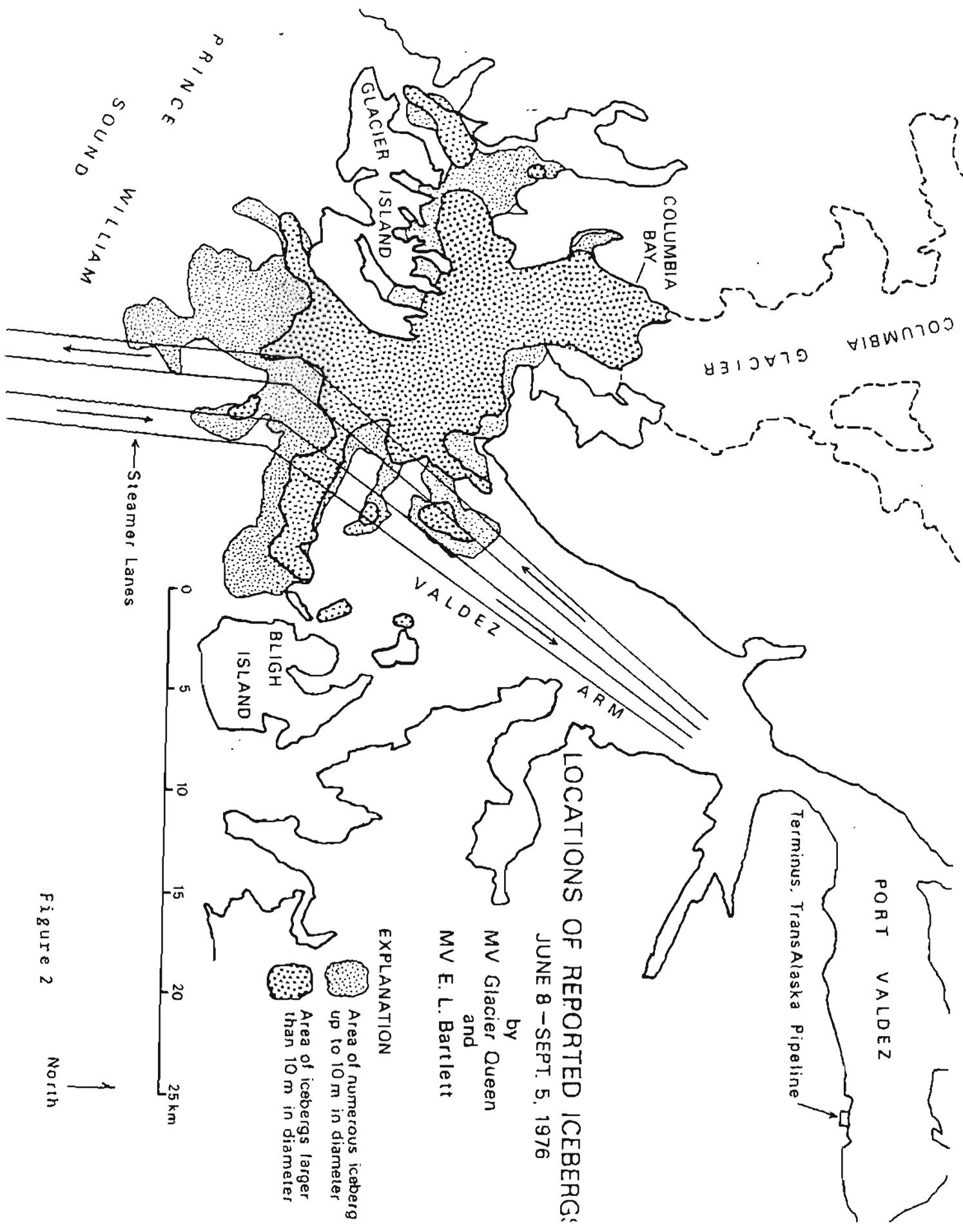


Figure 2

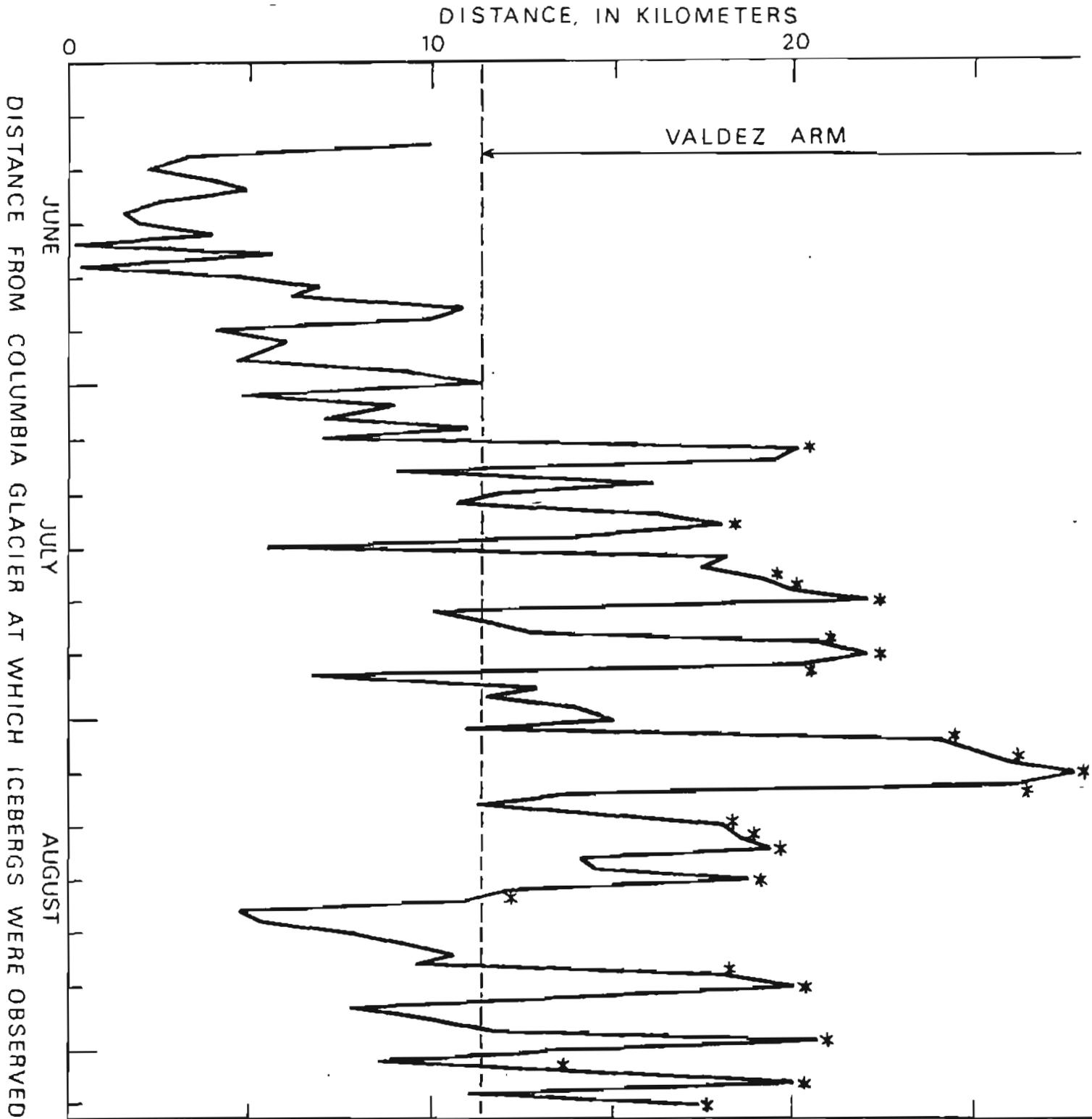


Figure 3