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A 700 mb ATLAS for the NORTHERN HEMISPHERE

Five-Day Mean Heights, Standard Deviations, and Changes for the 700 mb Pressure Surface

EBERHARD W. WAHL and
JAMES F. LAHEY

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INTRODUCTION

This atlas represents a compilation of data related to our studies of the dynamic climatology of large-scale atmospheric circulation. It is a continuation of previous efforts, especially the earlier *Atlas of Five-Day Normal Sea-Level Pressure Charts for the Northern Hemisphere*, published by the University of Wisconsin Press in 1958. Several factors, not the least being additional data accumulation during the passage of ten years, have now made it possible to compile similar data for upper levels. The first upper pressure surface chosen for this atlas is the 700 mb level. It is hoped that, at some future time, data for additional upper levels can be compiled in a similar format.

SOURCE MATERIAL

The basic data used to construct the charts in this atlas consist of daily 700 mb data supplied to us by the Extended Forecast Division, Weather Bureau, Environmental Sciences Services Administration (ESSA). These data, recorded on magnetic tape, were given in the form of height values (in feet) of the 700 mb level at geographic coordinate points. A total of 469 such values for each daily map were recorded in the usual diamond grid pattern of latitude/longitude crossing grid points. The spacing in latitude was five degrees, while, along each parallel, data were recorded in ten-degree longitudinal steps. At each parallel whose designation ended in a "0" (20°N, 30°N, . . .), data were given at 0°, 10°W, 20°W, . . ., 350°W; while at parallels ending with a "5" (25°N, 35°N, . . .), data were given at 5°W, 15°W, ... One value was recorded at the pole, but no data existed at latitude 85°N —these data, when needed, can be interpolated easily from the values at 80°N and the polar height value.

We were provided with data for two maps per day, one at 00Z, one at 12Z. After checking the data it was decided to use the 12Z maps only in order to preserve uniform local time; 12Z was chosen in preference to 00Z because of the somewhat more complete status of these data. Further extensive checking of the data for inconsistencies and lack of coverage revealed that a complete map without regions of missing coverage could be obtained only by using a starting date of January 1, 1951. This date, then, was chosen as the beginning point of our compilations. We had available to us complete data for fifteen years through December 31, 1965; in fact, data actually ran through March 15, 1966. For purposes of this atlas, however, the complete fifteen years from 1951 through 1965 were used.

THE CHARTS

This atlas contains, for each of the seventy-three discrete fixed five-day periods in a year, a set of three maps, namely: (a) a map of mean 700 mb heights; (b) a map showing the magnitude of one standard deviation from this height; and (c) a map of height change from the five-day period in question to the next five-day period. Positive values indicate a height increase to the following period, negative values a decrease.

All values are given in units of feet. Isolines on maps (a) are drawn for prime intervals of two hundred feet, with intermediate one-hundred-foot dashed isolines added where deemed necessary. On maps (b), isolines are drawn for intervals of fifty feet. On maps (c), the isoline interval is fifty feet, with solid lines for zero and positive values, dashed lines for negative values. In the preparation of maps of type (a), data for fixed dates within a particular five-day interval (for example, January 1–5) were averaged for the fifteen years at each of the 469 grid points. These averages were then transcribed to a large working map at the proper geographic coordinates. Careful analysis of these maps was performed and the final analyzed and checked maps formed the basis for the preparation of the printed maps of the atlas. For all pentades except one, the total number of values making up the average of that particular grid point is seventy-five; the pentade February 25 through March 1 contained seventy-nine values due to our inclusion of four extra days (February 29) in the leap years 1952, 1956, 1960, and 1964.

For maps of type (b), additional calculations were performed. For each of the seventy-five (seventy-nine) daily values at a given grid point in a particular pentade, the difference (Δh) between this value and the appropriate five-day average was obtained. The standard deviation was then computed according to the following formula:

$$\sigma = \left(\frac{1}{n} \sum_{n} \Delta h^2 \right)^{1/2} ; \quad n = 75 \text{ (or } 79).$$

Plotted on a base map and analyzed, this standard deviation, the spatial distribution of which is depicted on maps of type (b), represents a comparison standard for the deviation of an individual daily 700 mb map from the appropriate five-day mean map. It will allow, for example, the comparison of a particular grid point in terms of the statistical variability at that point during the particular pentade in question. It should thus be valuable in judging the behavior of the daily 700 mb patterns as compared to climatic normals.

Finally, maps of type (c) were obtained by forming the difference between the 700 mb heights for the five-day period in question and the subsequent period for each grid point and analysing the spatial distribution of these values. Quite apart from the usefulness of this calculation to the direct preparation of the maps (the differences provide an excellent check for the validity of the means in maps [a]), we feel that the change maps have interest on their own merit. For example, cursory examination of the sequence

of these maps indicates that, at certain specific times, the magnitude of change between adjacent five-day-mean maps increases considerably in certain geographic areas, indicating, possibly, preferred times of significant changes on the behavior pattern of the 700 mb circulation. Information concerning the availability of the data from which this atlas has been compiled can be obtained from the Department of Meterology, University of Wisconsin.

ACKNOWLEDGMENTS

The preparation of such an atlas, by necessity, requires the dedicated collaboration of many individuals. We wish to gratefully acknowledge contribution of time and effort of the following people: Computations—Peter J. Guetter, Pauline S. Edwards, programmers; Analysis—Cheryl C. Behrens, William B. Bendel, Bruce F. Berryman, and Allen J. Riordan, together with the authors; and Cartography—James A. Bier, cartographer, assisted by Chatchai Pongprayoon, draftsman, and by Mrs. Elsa Roy and Mrs. James Lahey, lettering and checking.

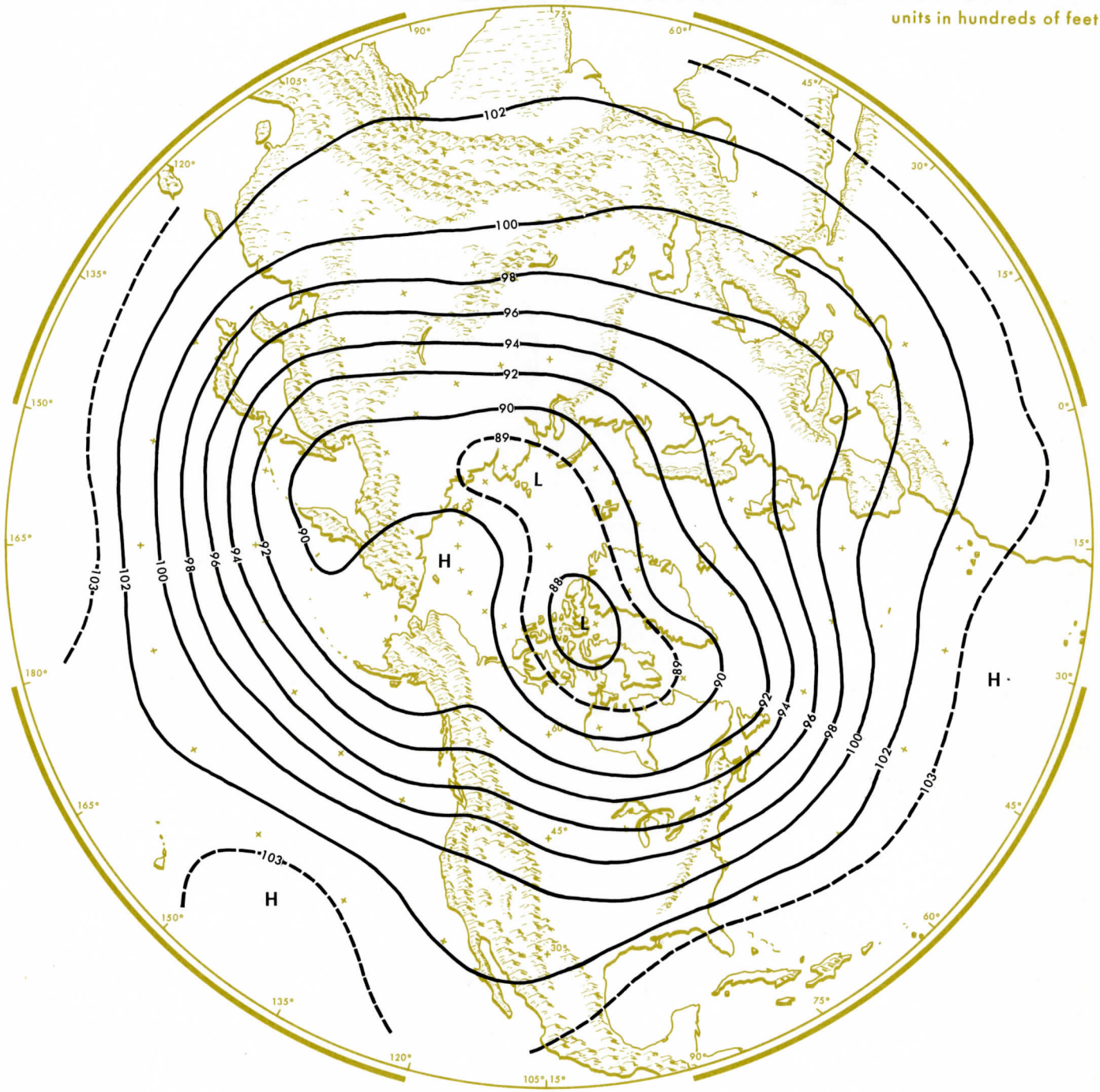
The original computer tapes containing the basic data were furnished by the Extended Forecast Division, ESSA. We gratefully express our appreciation for this cooperation to its chief, Jerome Namias. The preparation of data, calculations of final values, and analysis of maps were supported by National Science Foundation Grant GA-921. Drafting and preparation of final maps for printing was done in the Cartography Laboratory of the Department of Geography, University of Illinois, supported in part by the Department of Computer Science, University of Illinois, Urbana, Illinois, and in part by the Advanced Research Projects Agency as administered by the Rome Air Development Center under Contract Number USAF 30(602)4144.

E. W. Wahl, University of Wisconsin
J. F. Lahey, University of Illinois

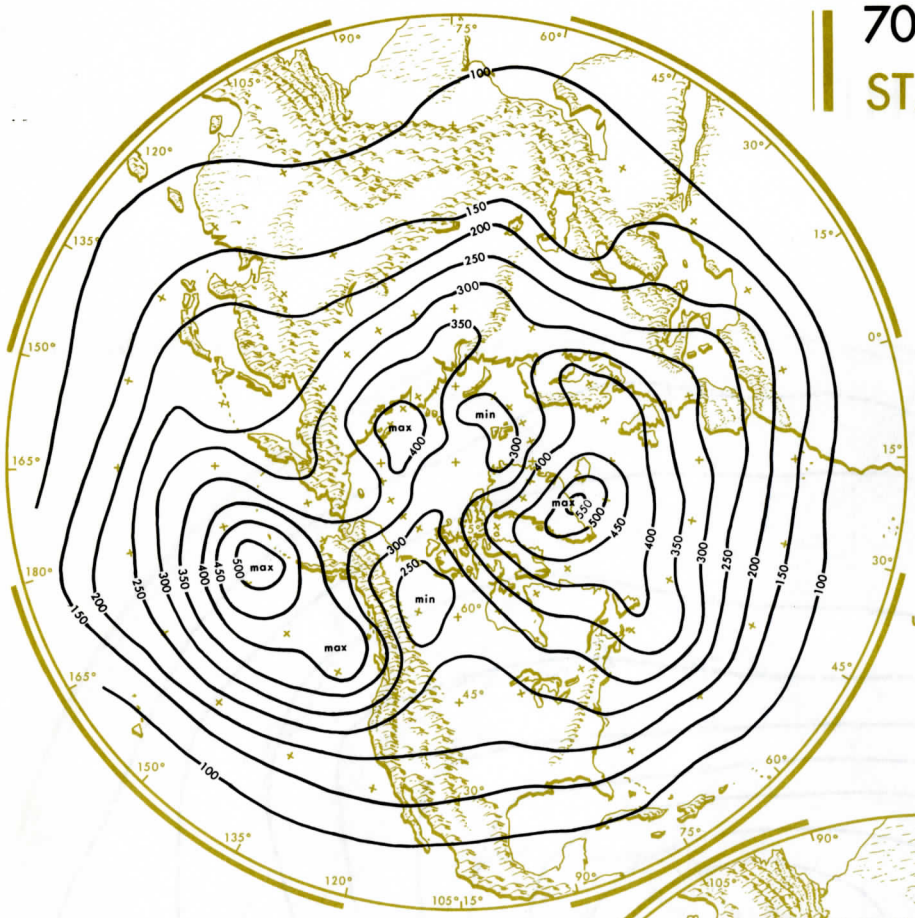
May 20, 1969

A 700 mb ATLAS for the NORTHERN HEMISPHERE

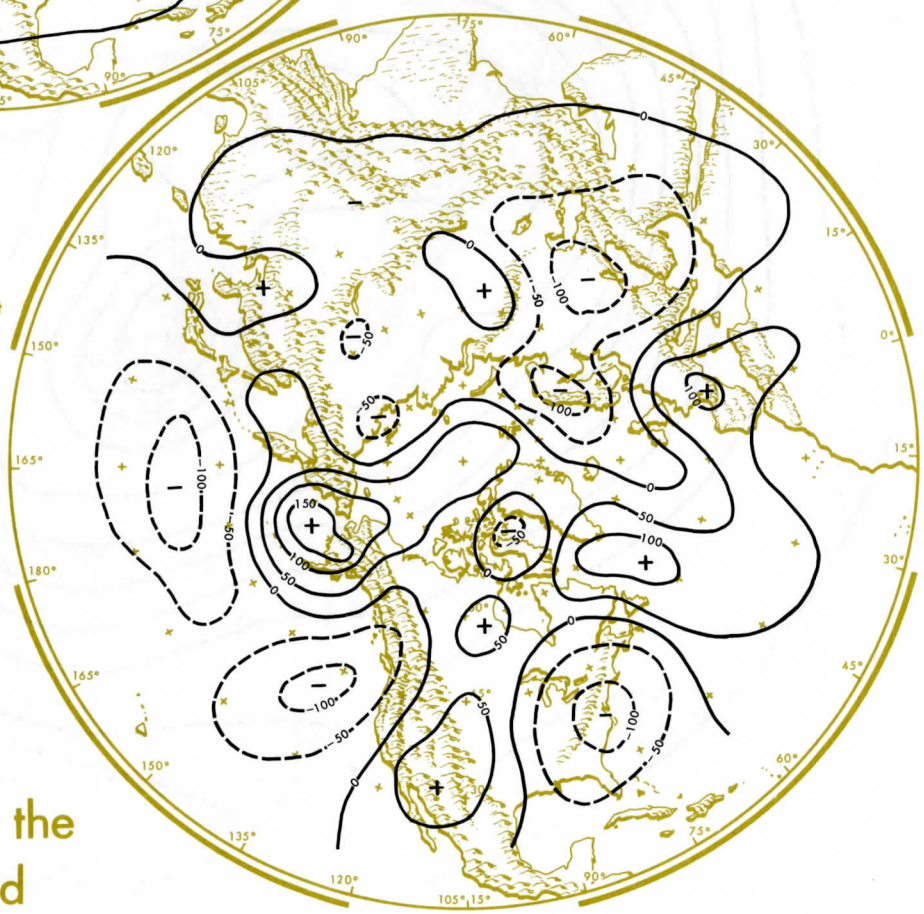
700 millibar
AVERAGE HEIGHT
January 1-5



700 millibar height
STANDARD DEVIATION



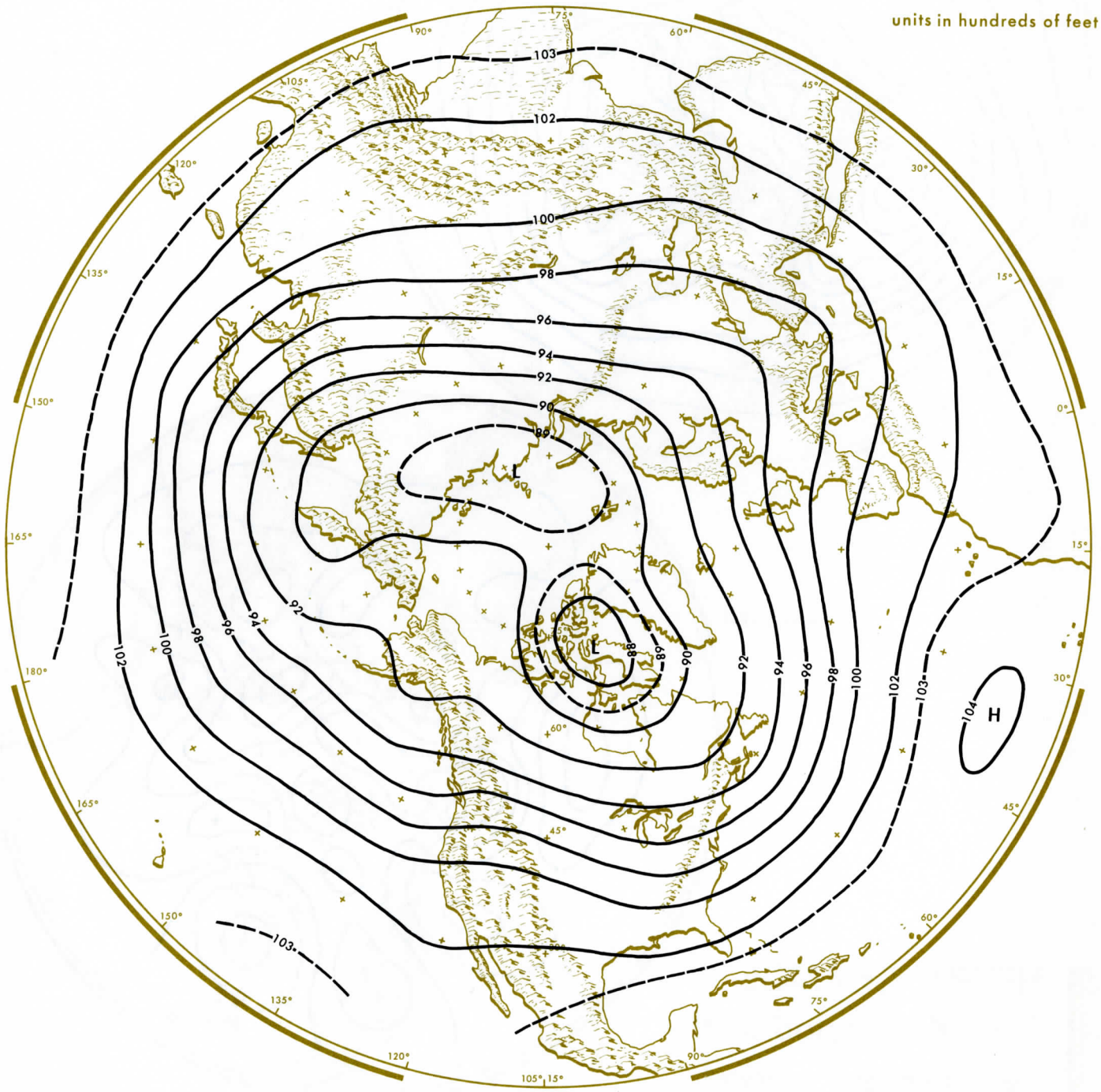
units in feet



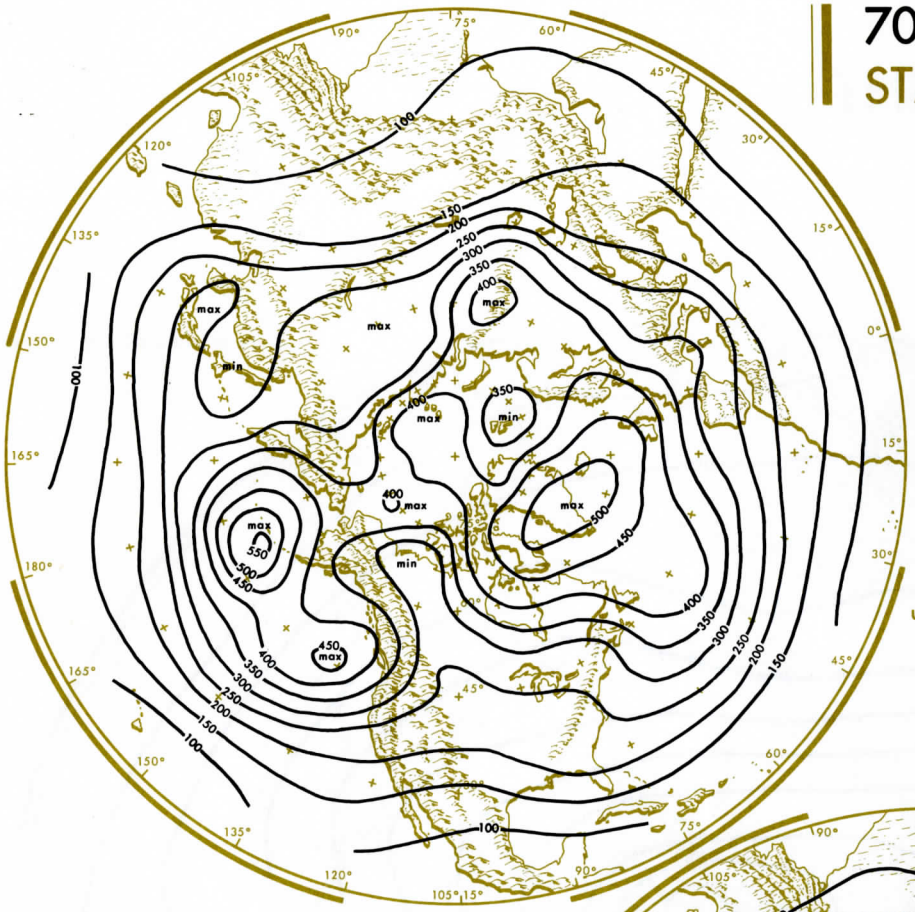
units in feet

HEIGHT CHANGE
from this period to the next five-day period

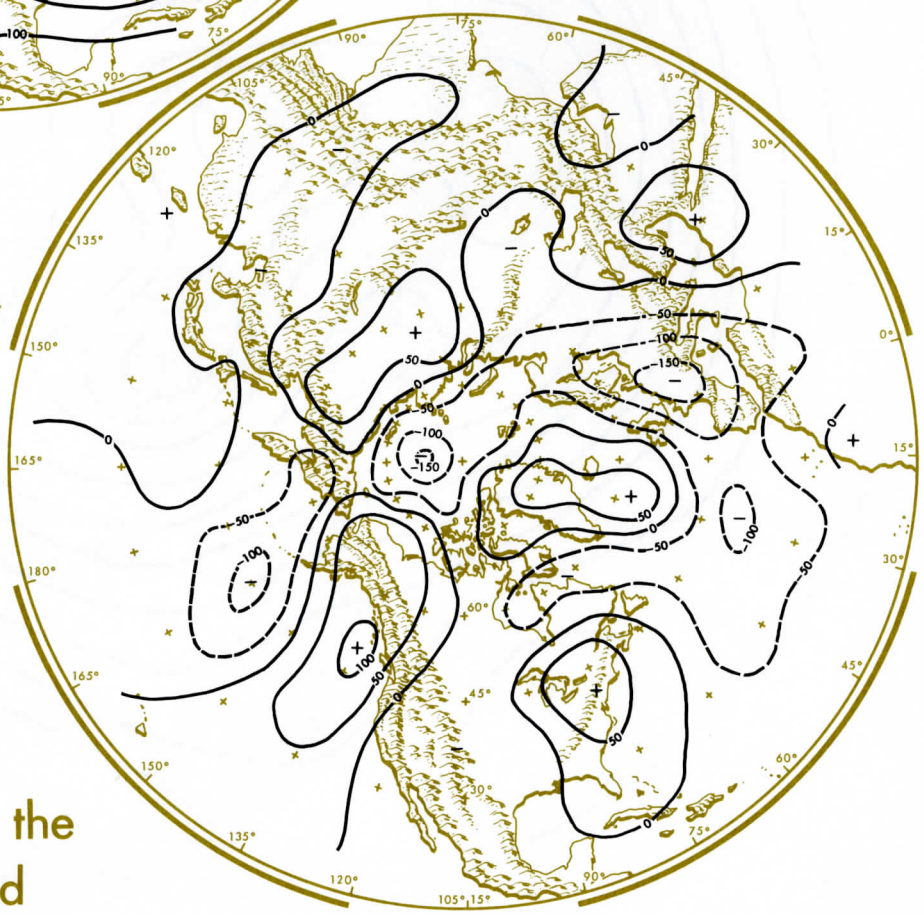
700 millibar
AVERAGE HEIGHT
January 6-10



700 millibar height
STANDARD DEVIATION



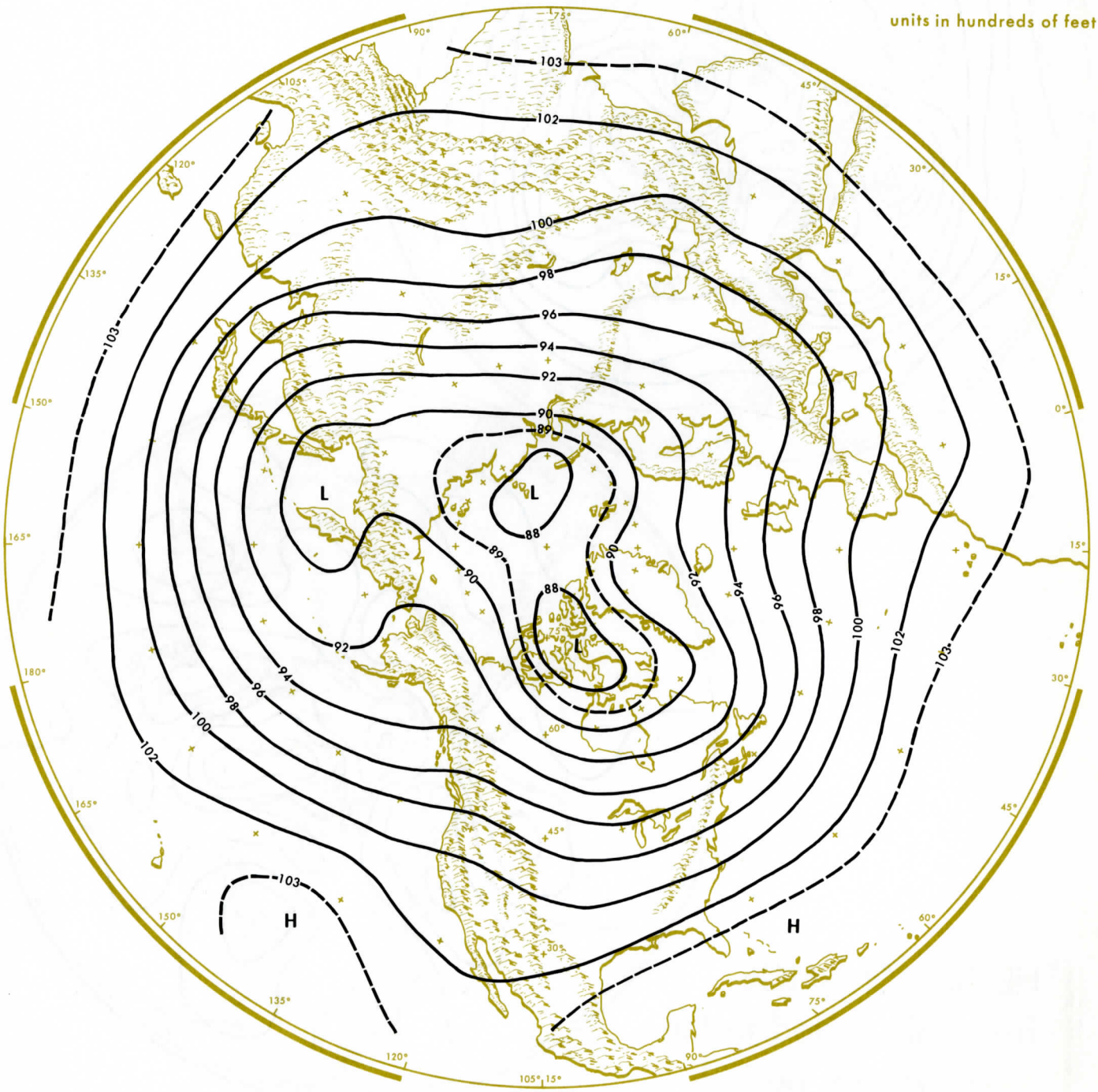
units in feet



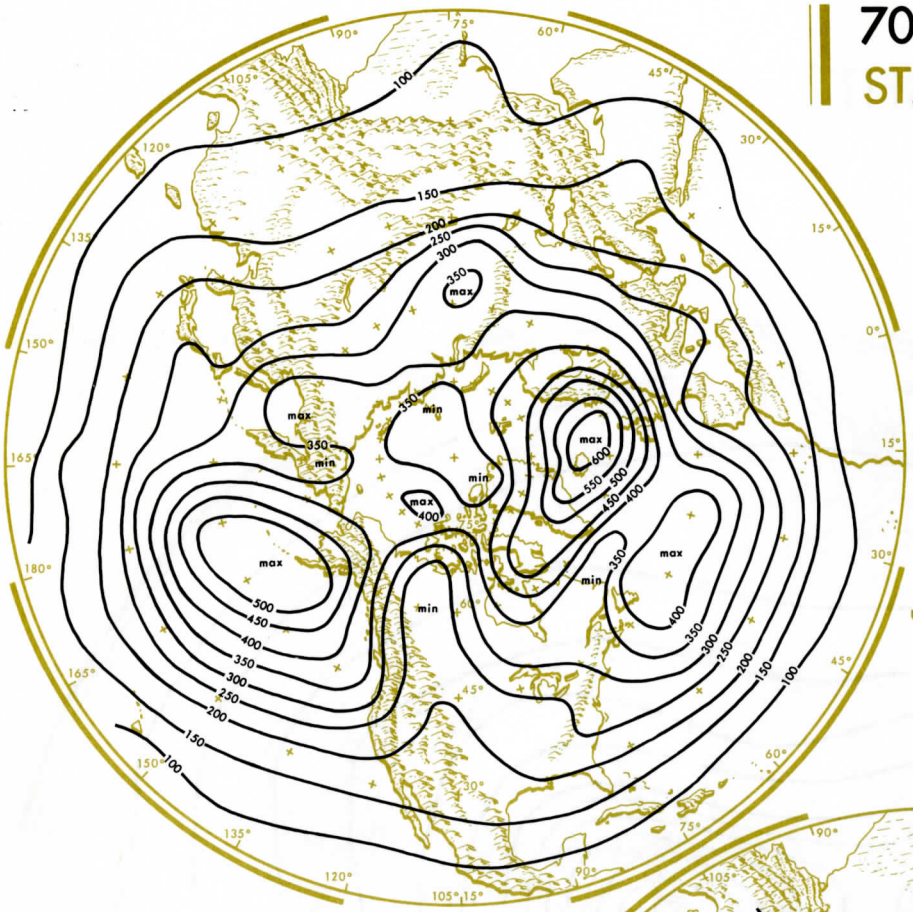
units in feet

HEIGHT CHANGE
from this period to the next five-day period

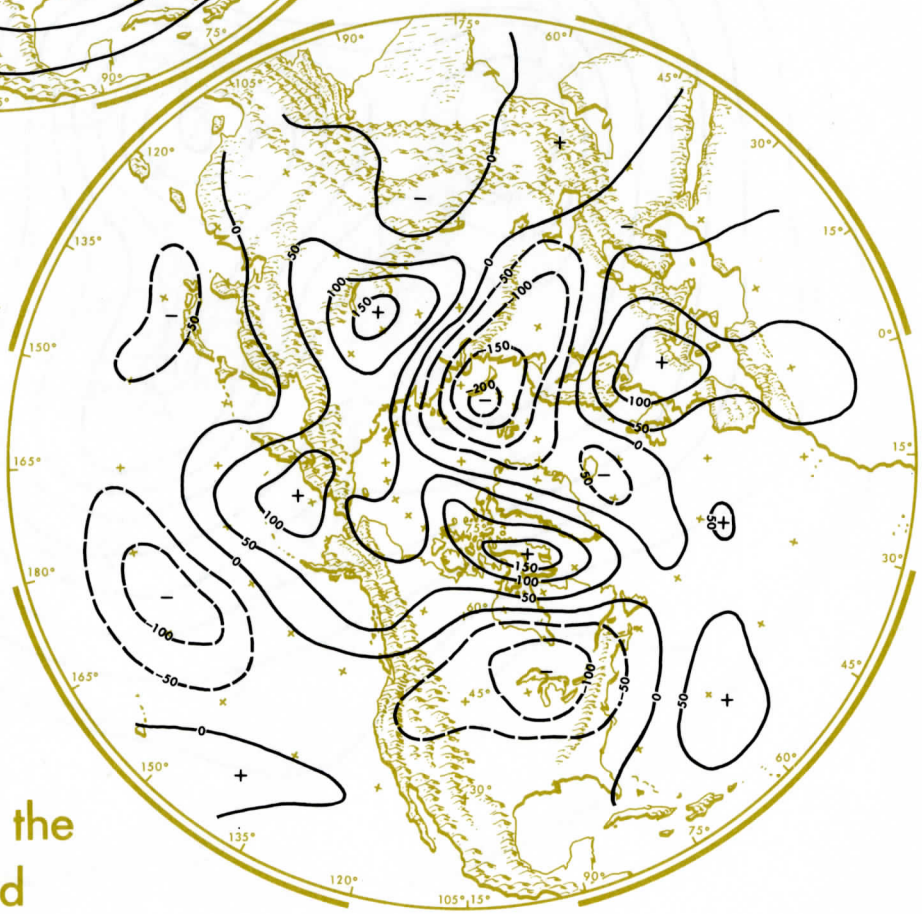
700 millibar
AVERAGE HEIGHT
January 11-15



700 millibar height
STANDARD DEVIATION



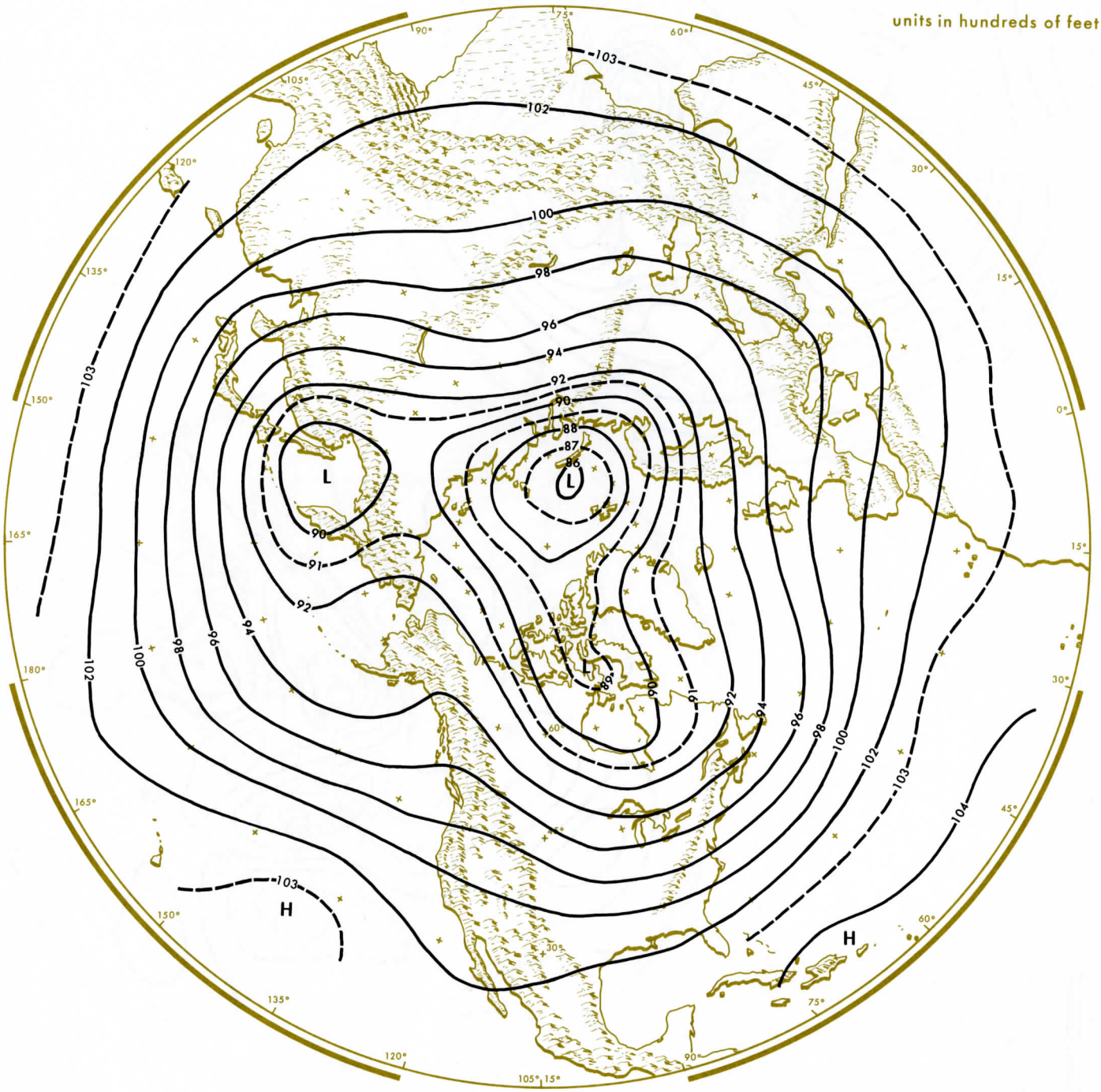
units in feet



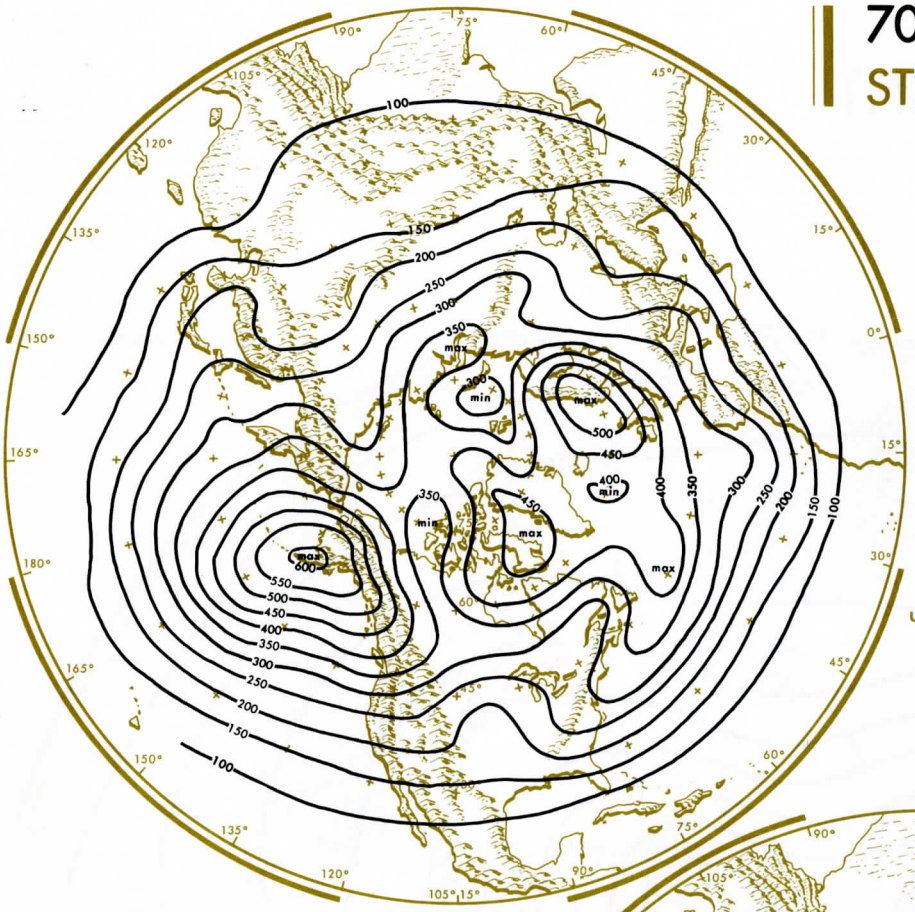
units in feet

HEIGHT CHANGE
from this period to the next five-day period

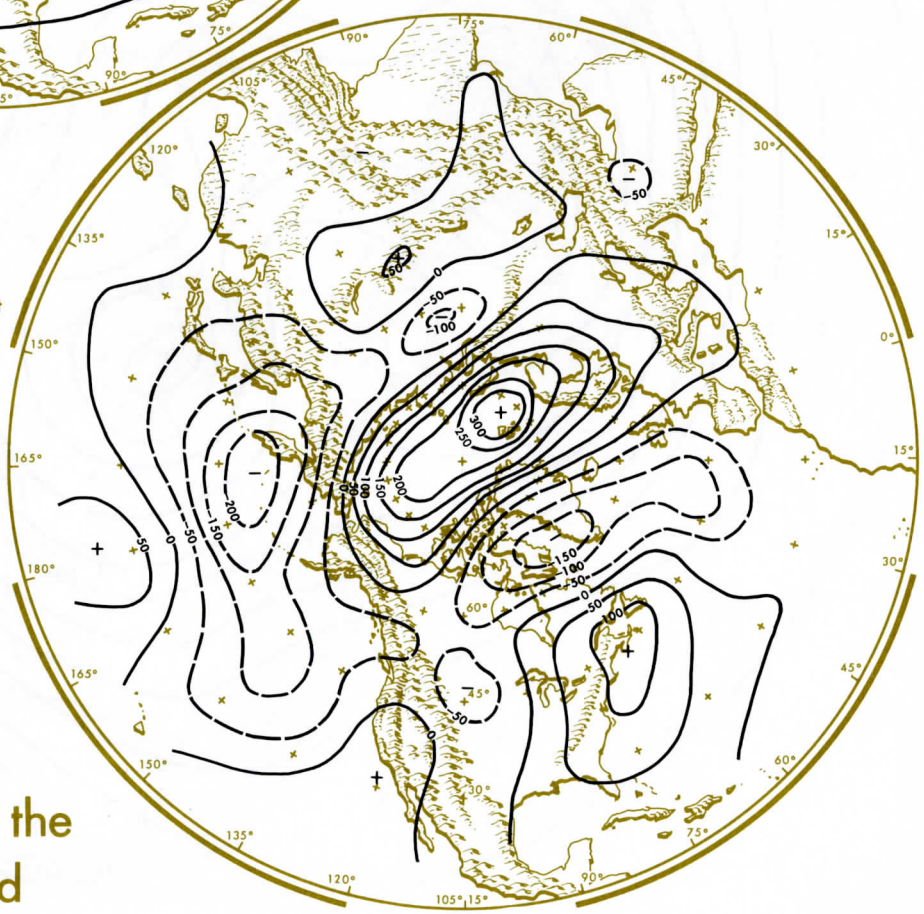
700 millibar
AVERAGE HEIGHT
January 16-20



700 millibar height
STANDARD DEVIATION



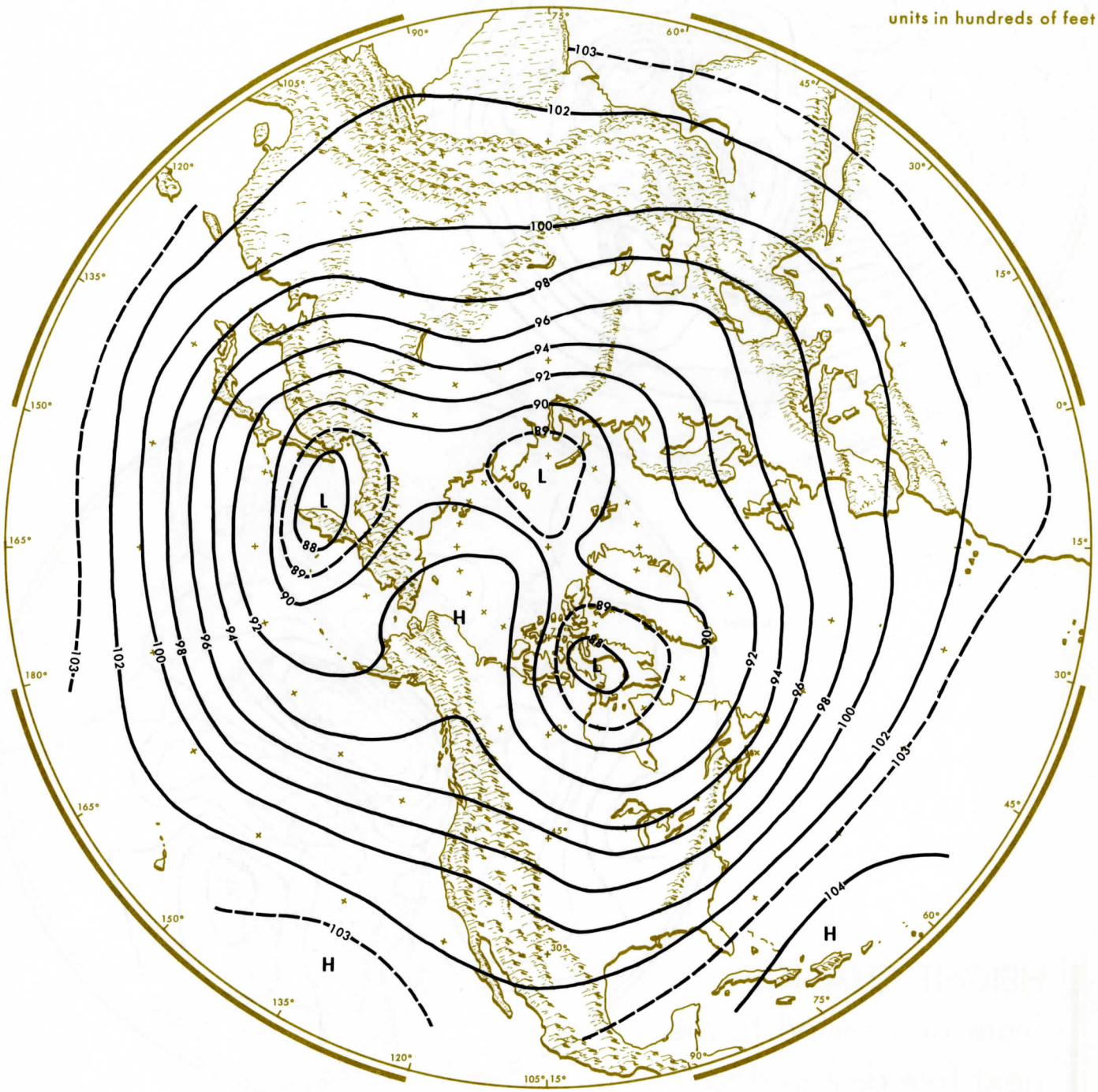
units in feet



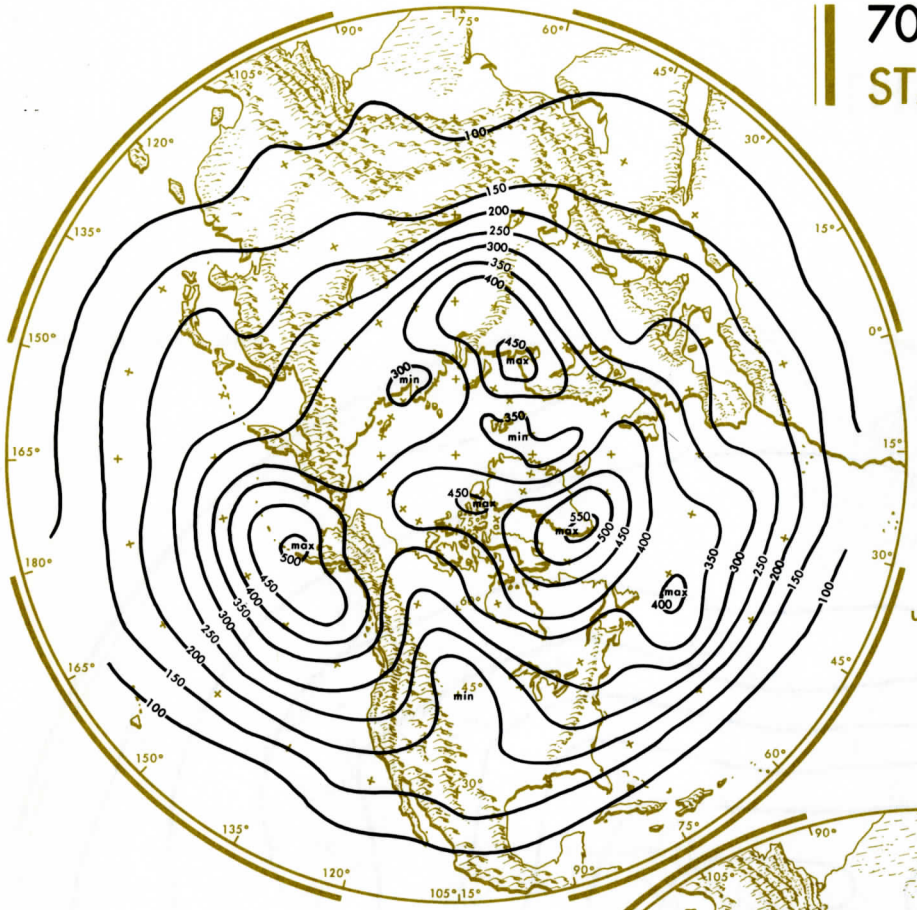
units in feet

HEIGHT CHANGE
from this period to the next five-day period

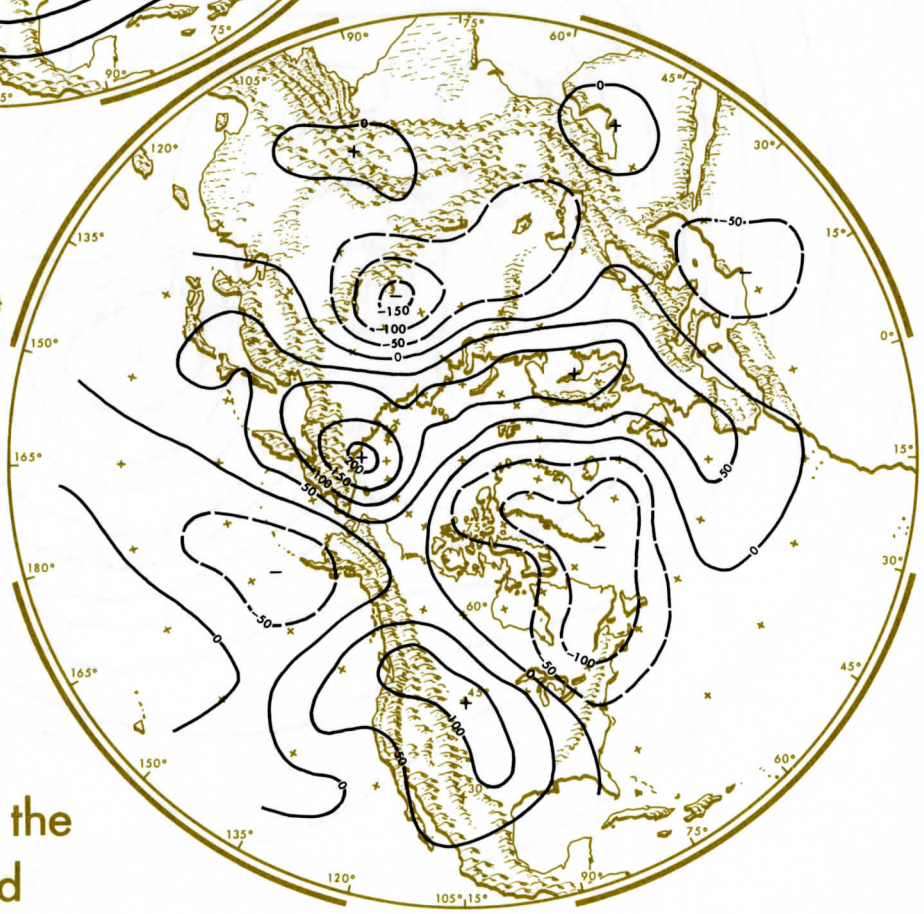
700 millibar
AVERAGE HEIGHT
January 21-25



700 millibar height
STANDARD DEVIATION



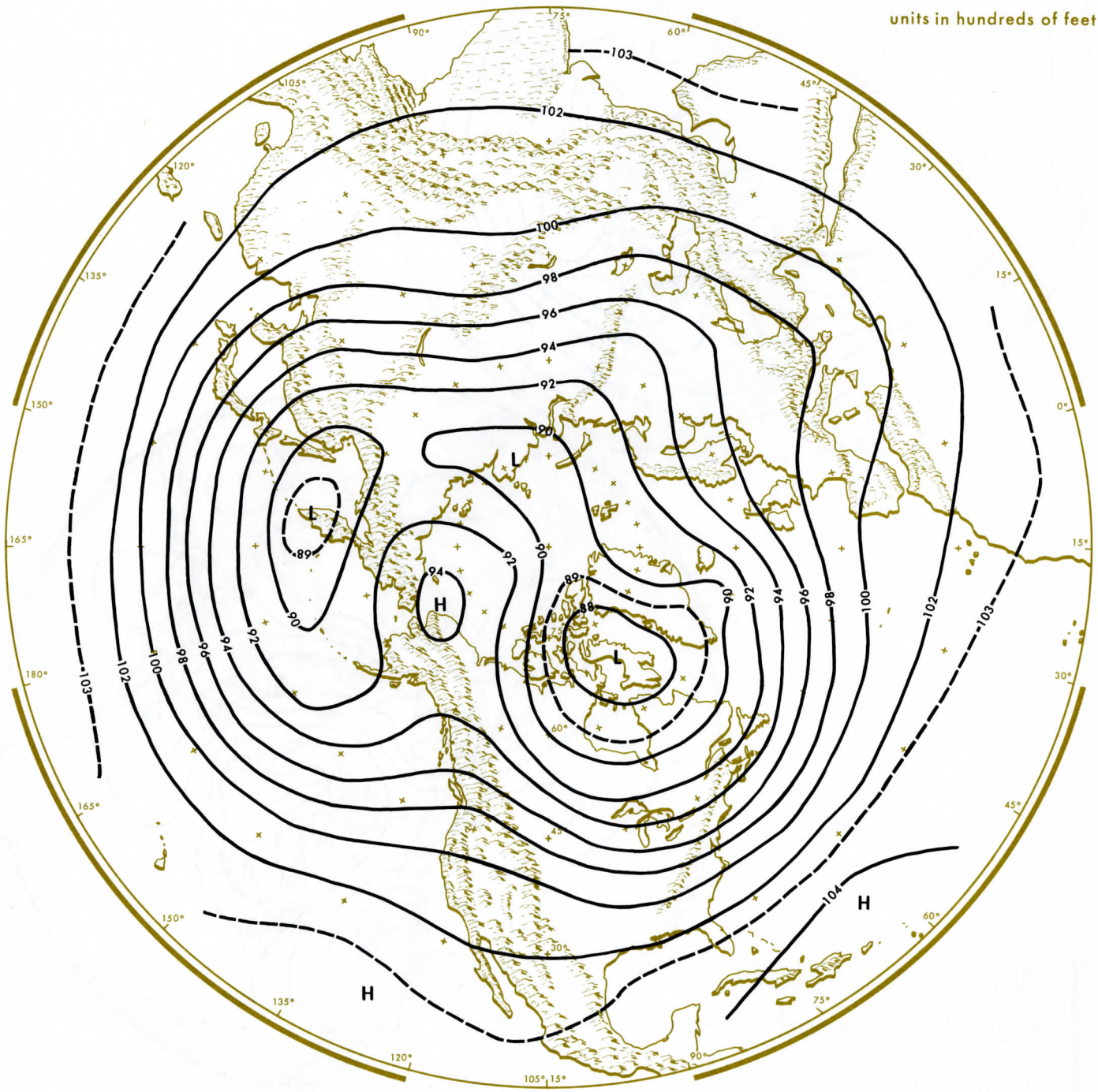
units in feet



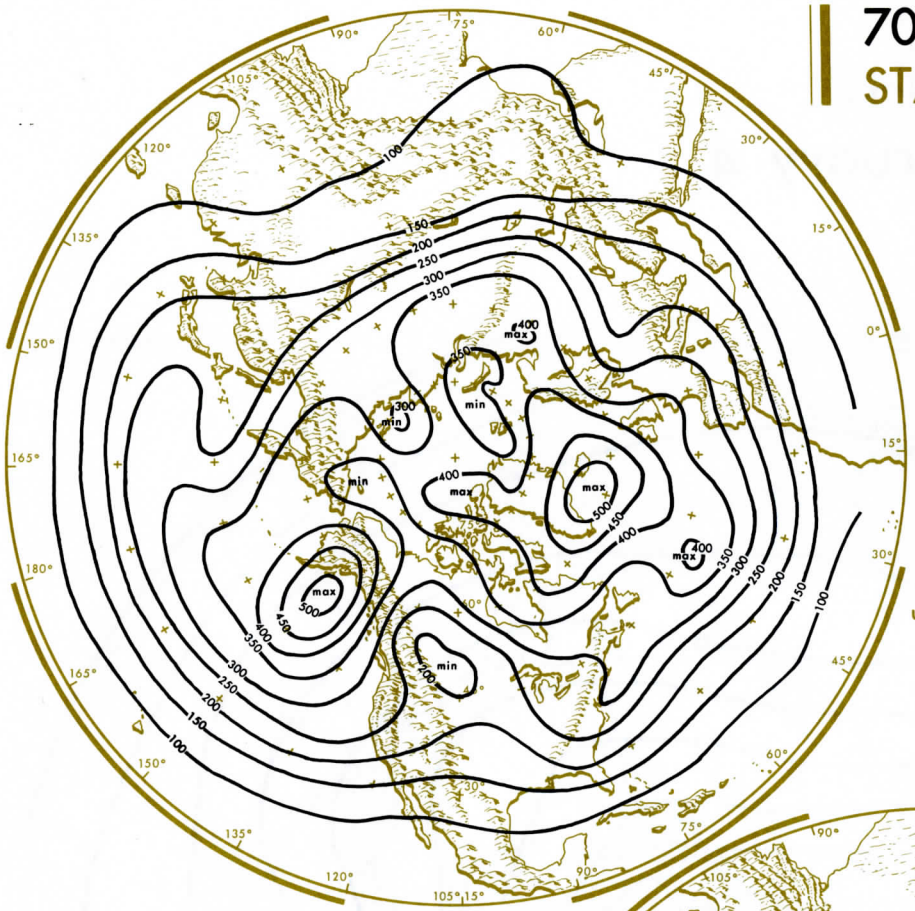
units in feet

HEIGHT CHANGE
from this period to the next five-day period

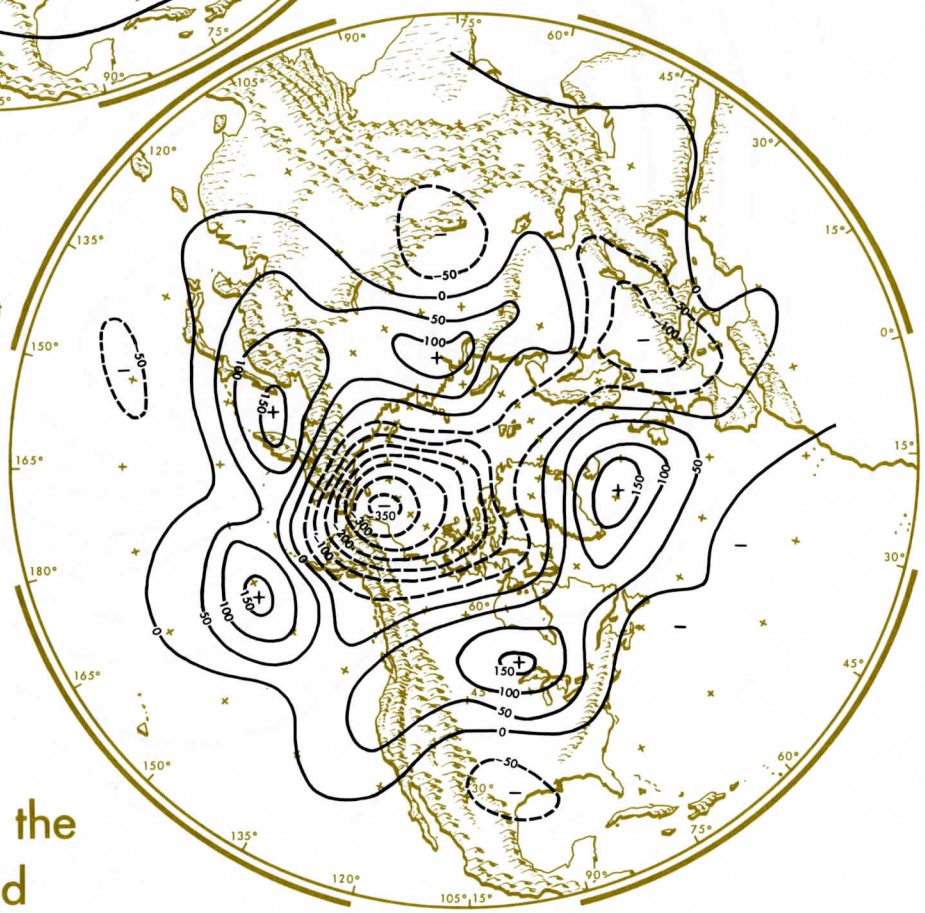
700 millibar
AVERAGE HEIGHT
January 26-30



700 millibar height
STANDARD DEVIATION



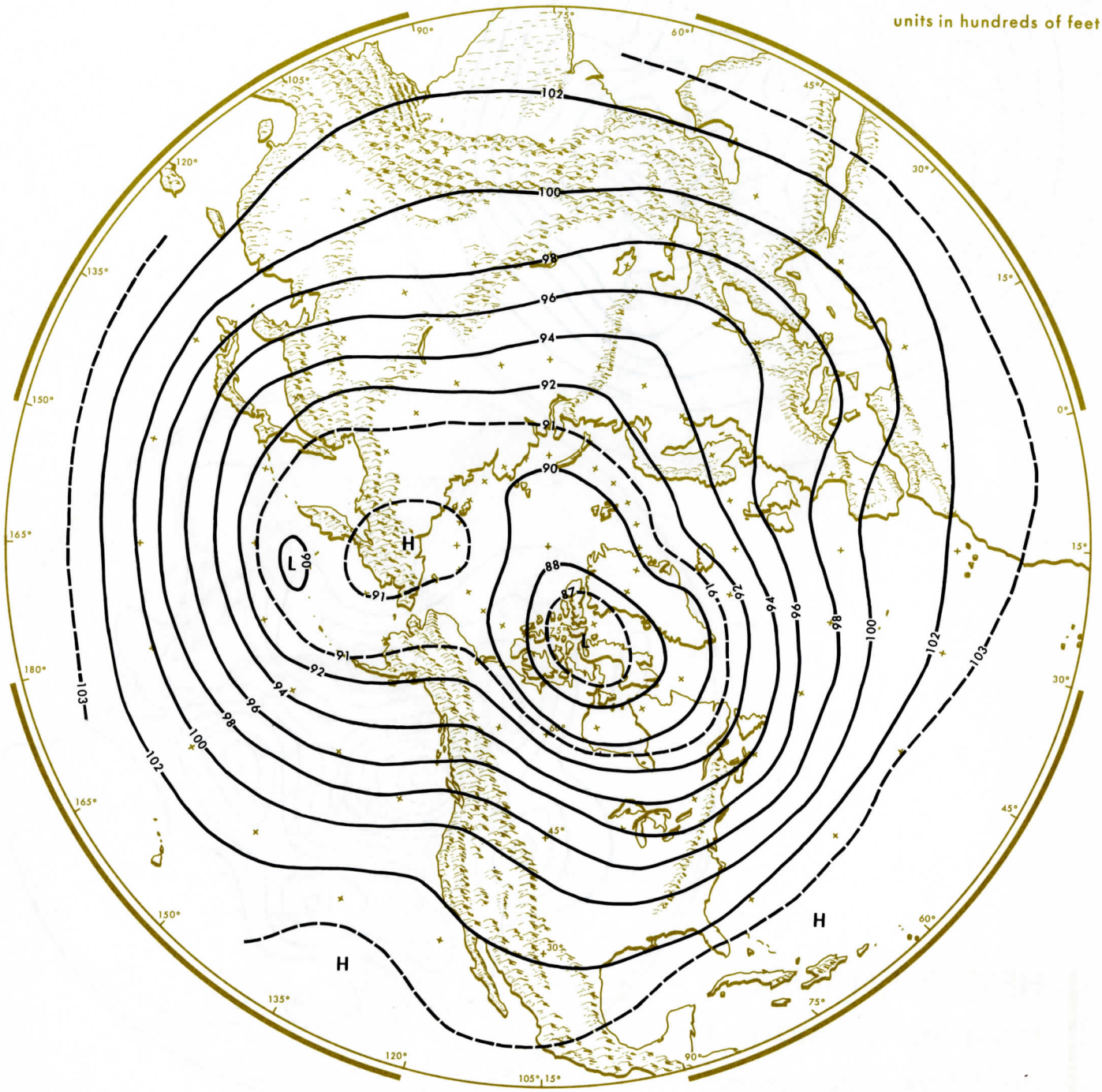
units in feet



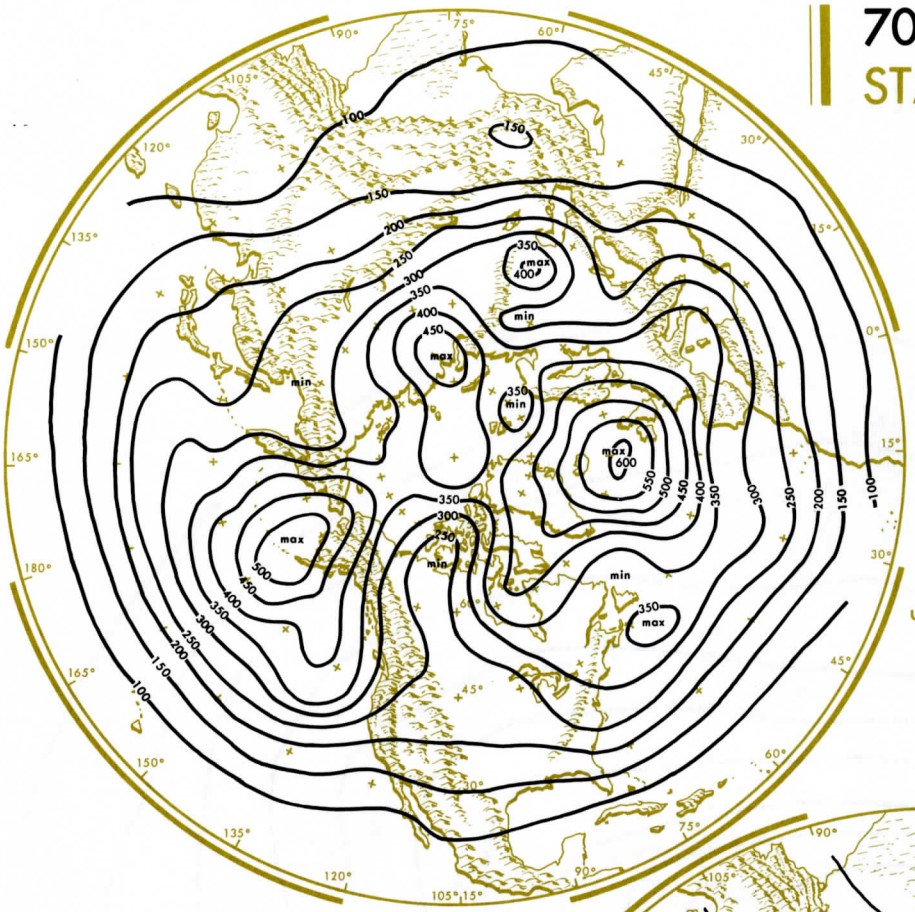
units in feet

HEIGHT CHANGE
from this period to the next five-day period

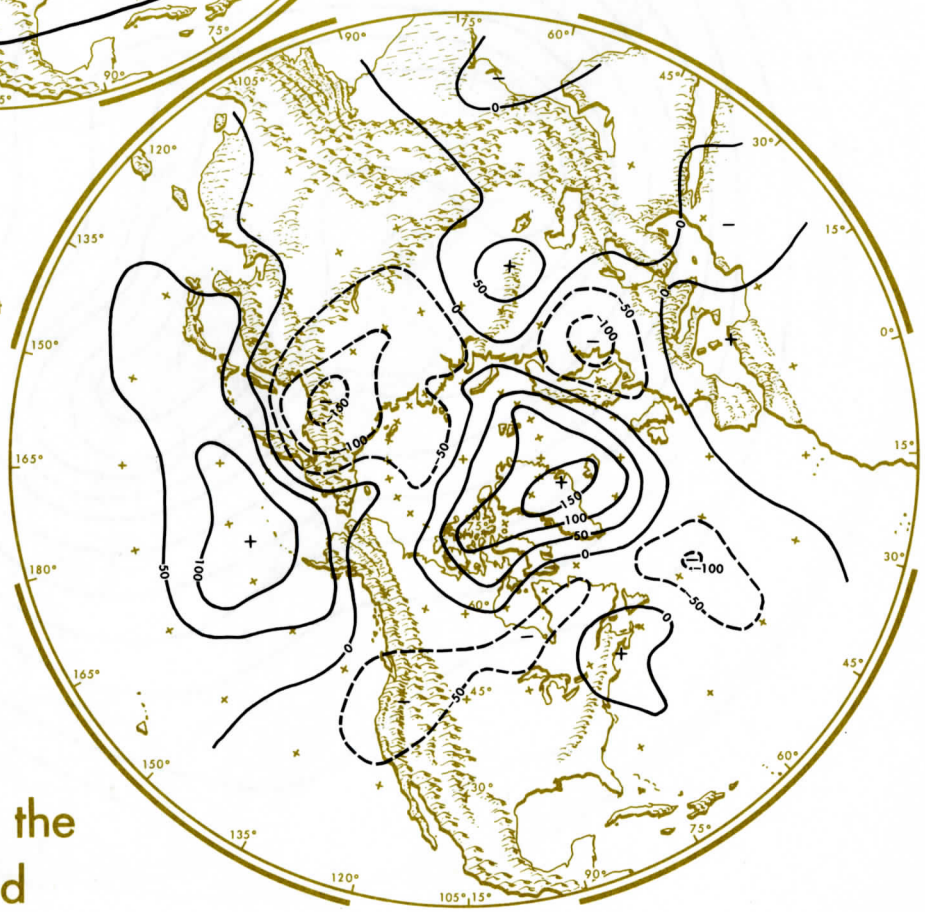
700 millibar
AVERAGE HEIGHT
January 31-February 4



700 millibar height
STANDARD DEVIATION



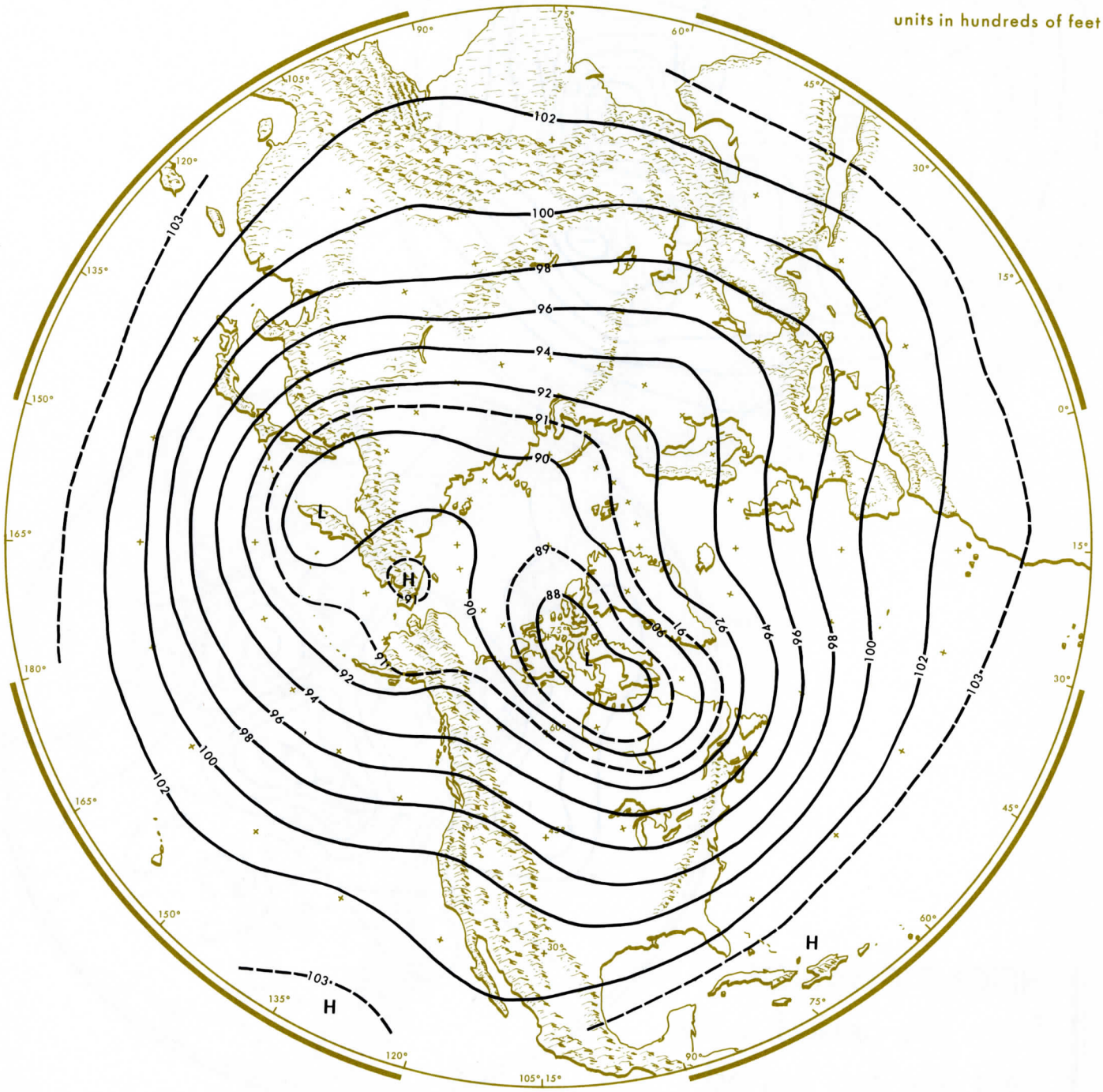
units in feet



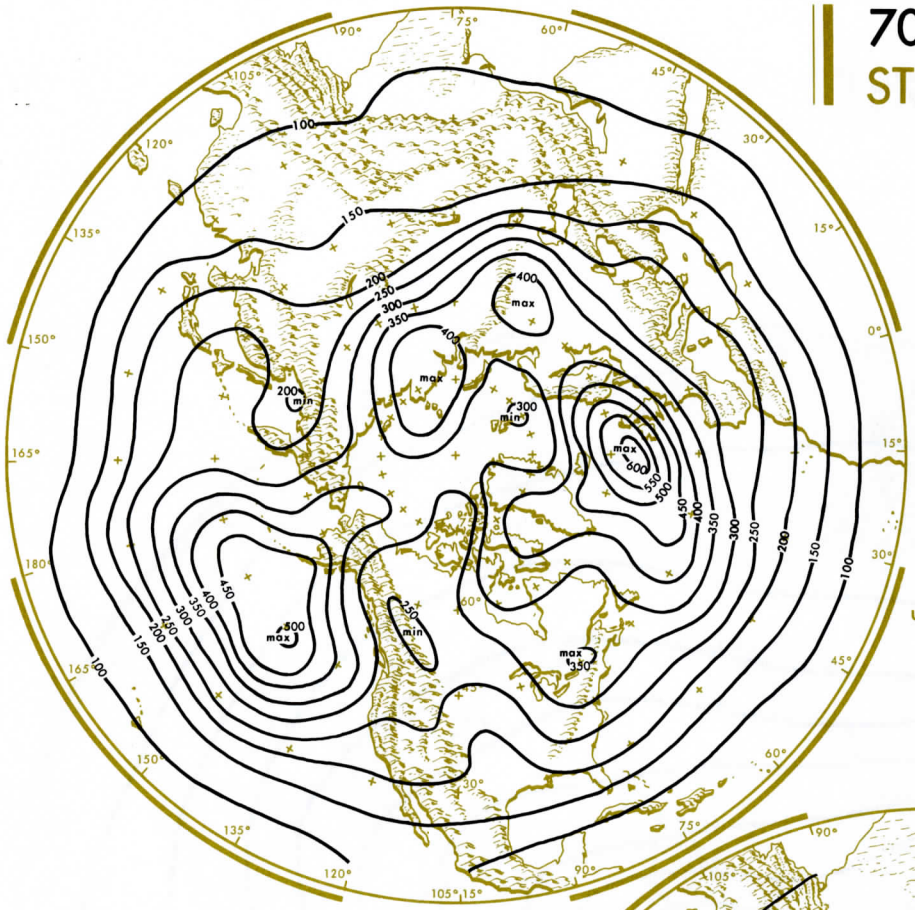
units in feet

HEIGHT CHANGE
from this period to the next five-day period

700 millibar
AVERAGE HEIGHT
February 5-9

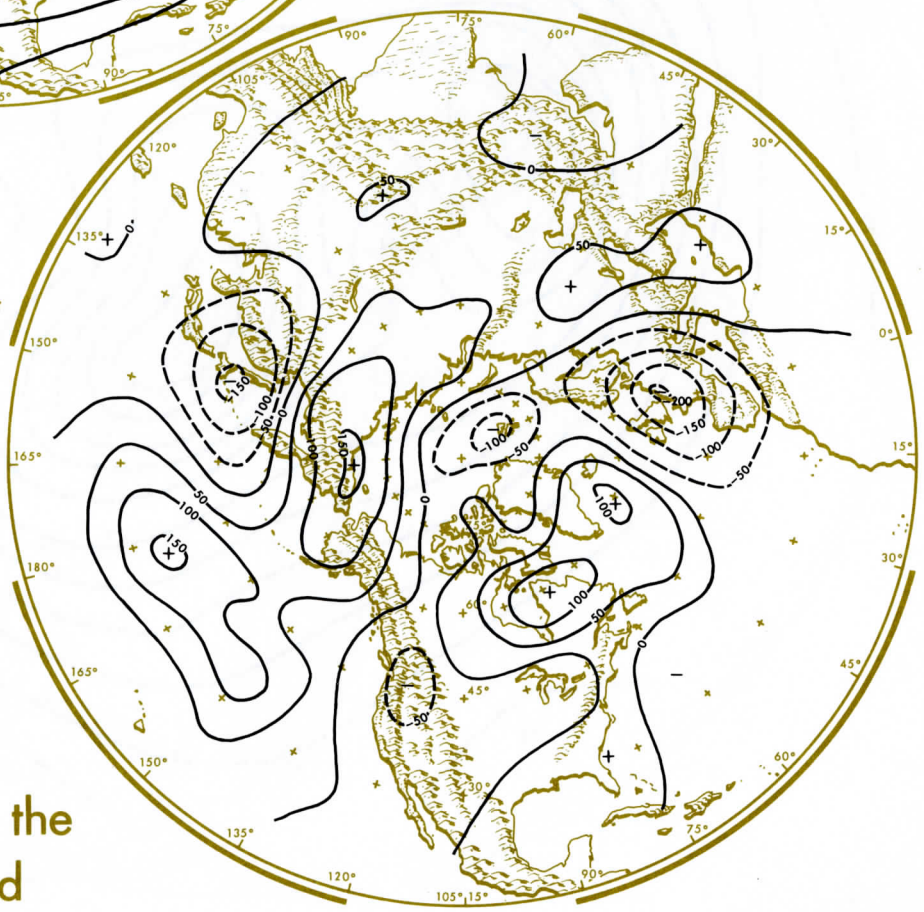


700 millibar height
STANDARD DEVIATION



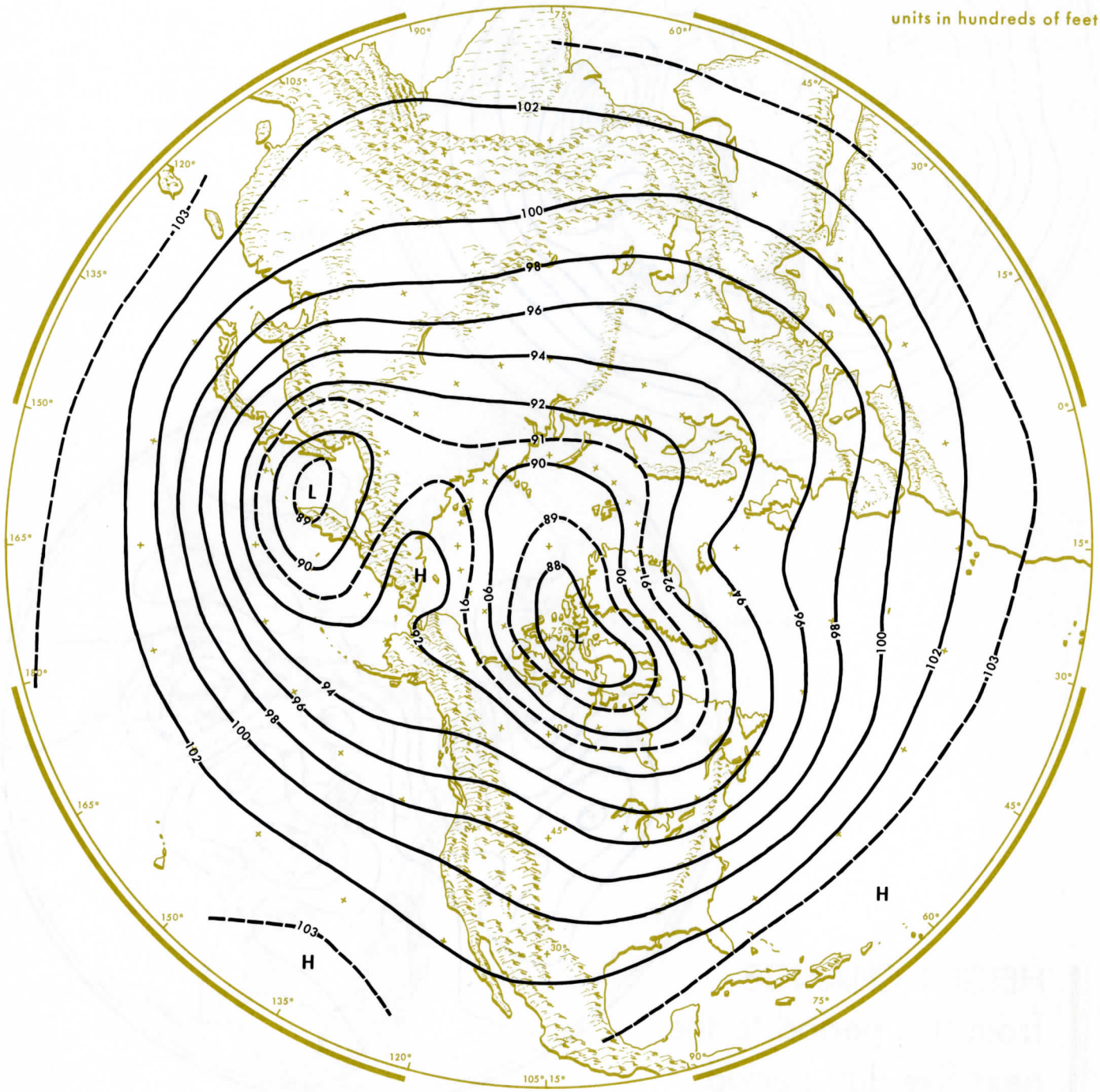
units in feet

units in feet

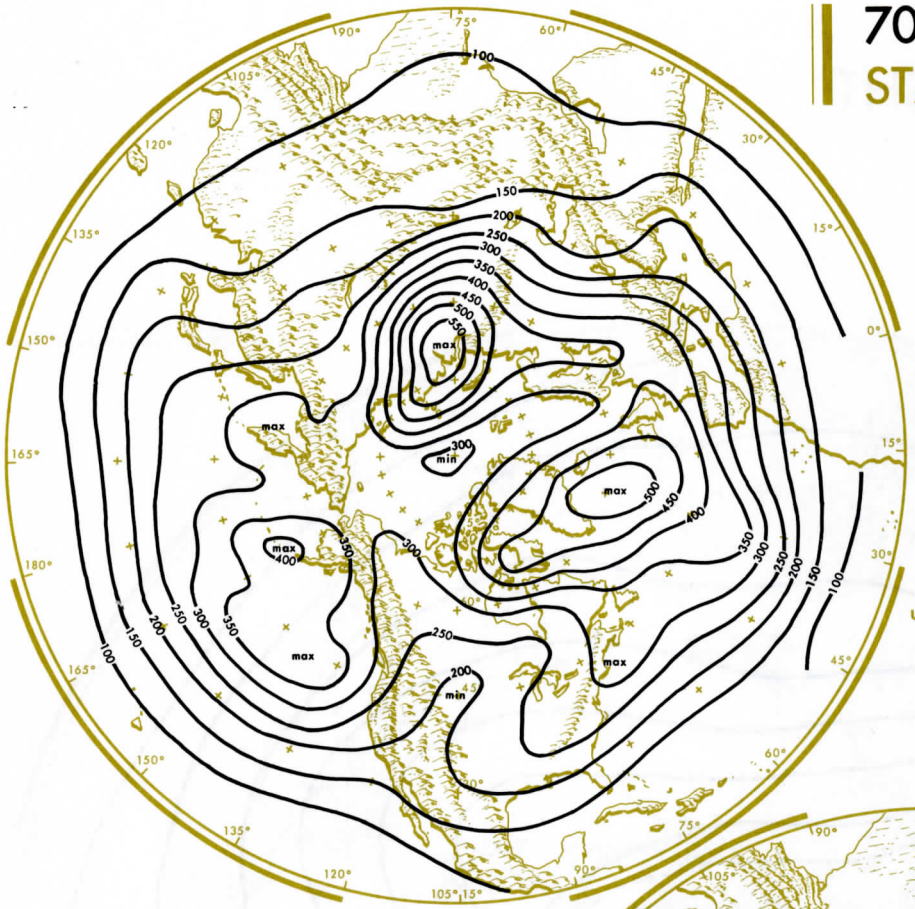


HEIGHT CHANGE
from this period to the next five-day period

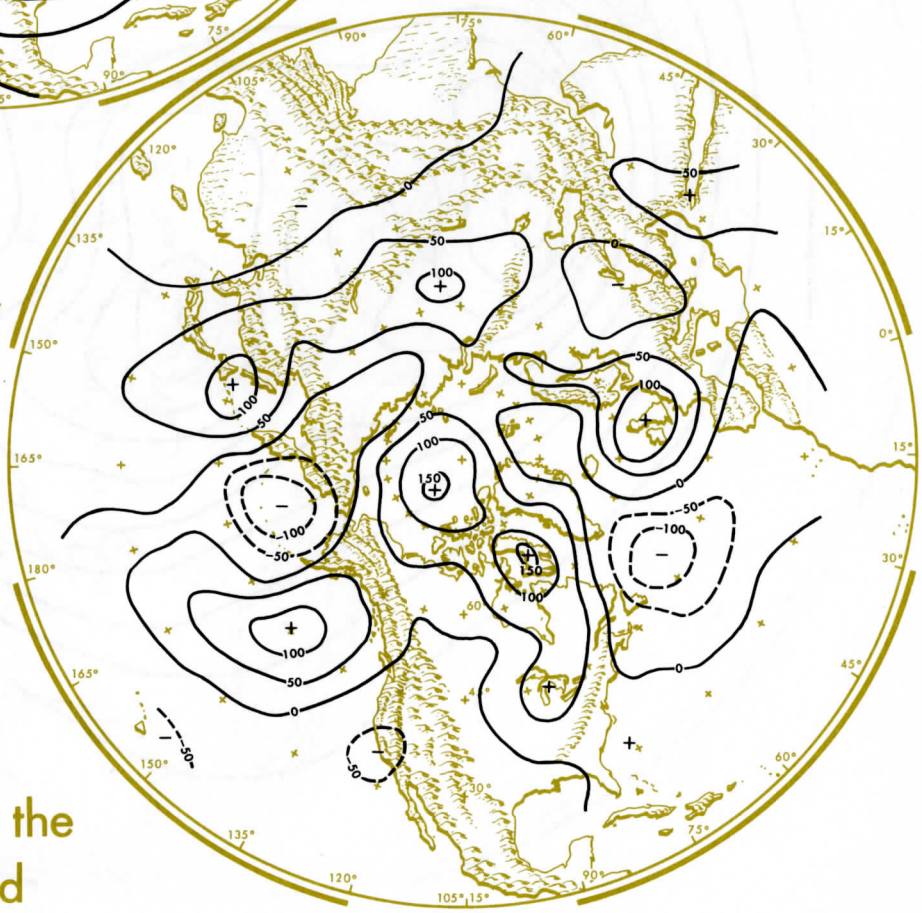
700 millibar
AVERAGE HEIGHT
February 10-14



700 millibar height
STANDARD DEVIATION



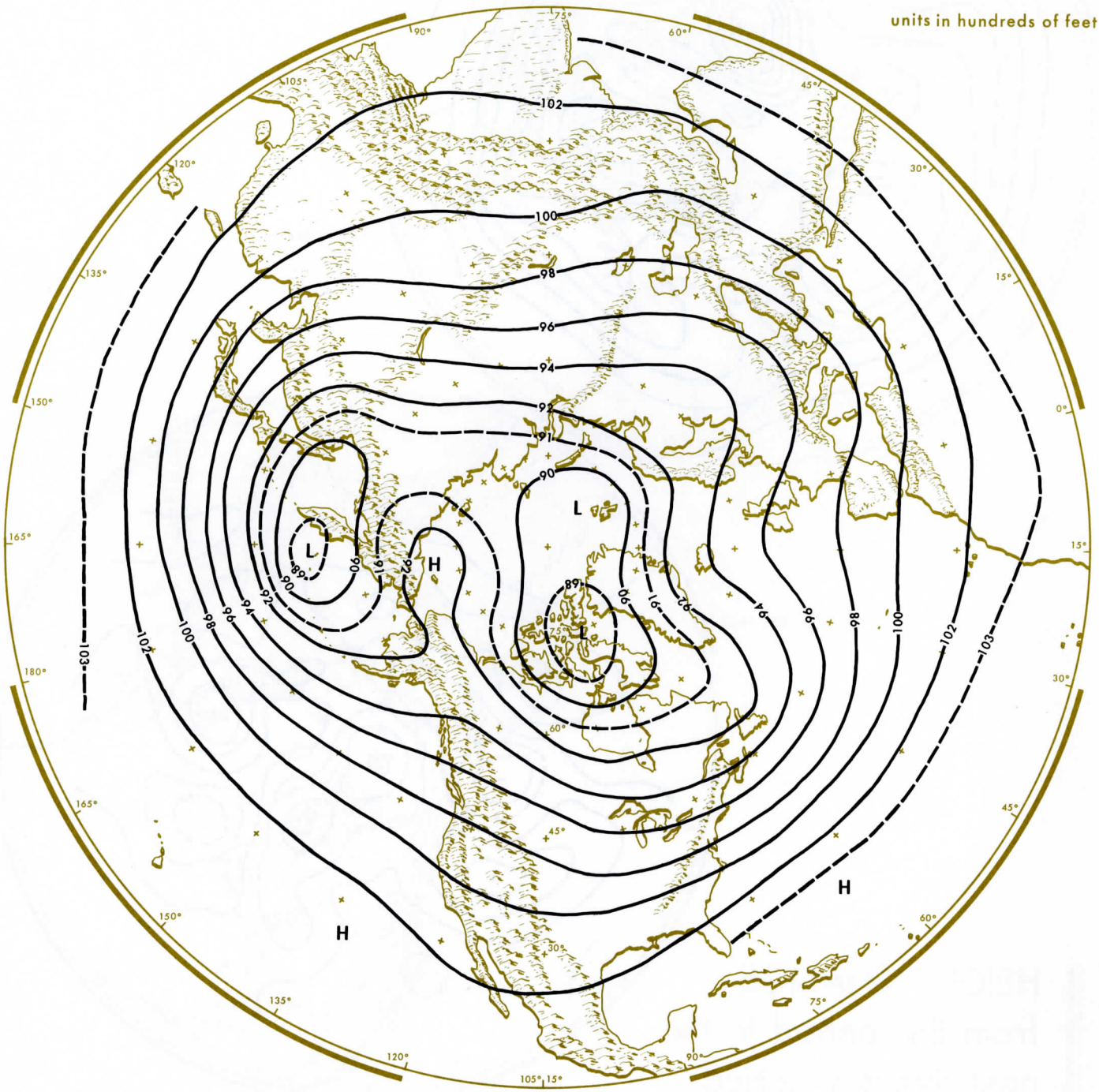
units in feet



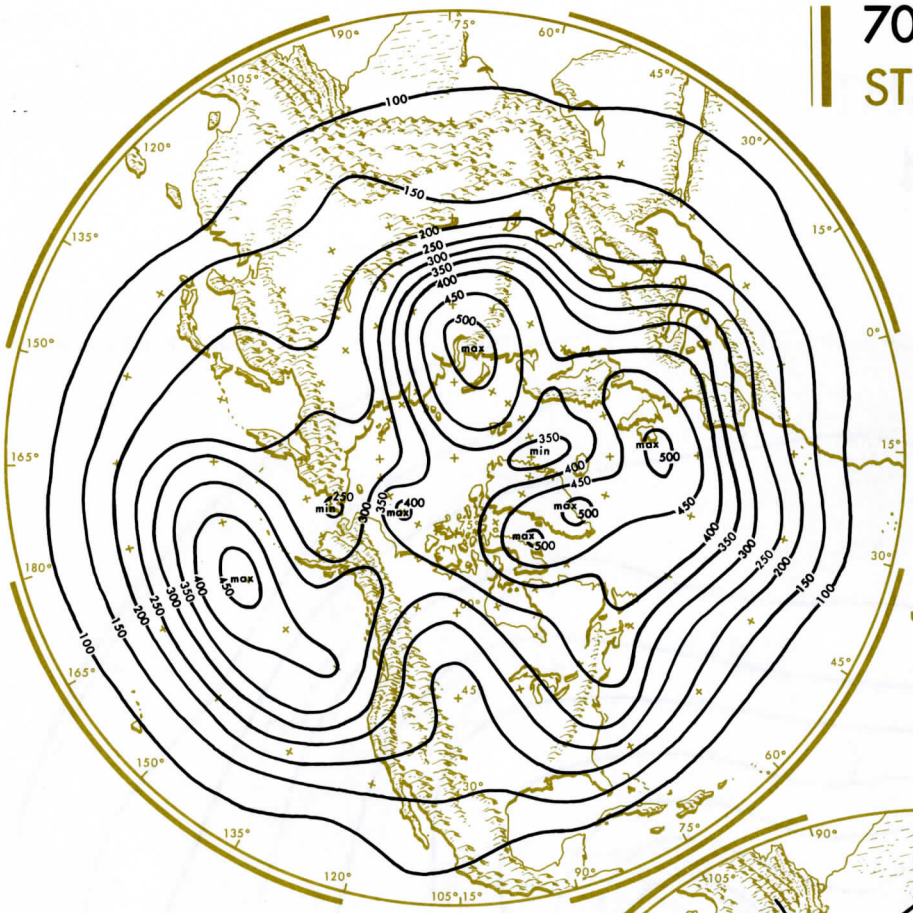
units in feet

HEIGHT CHANGE
from this period to the next five-day period

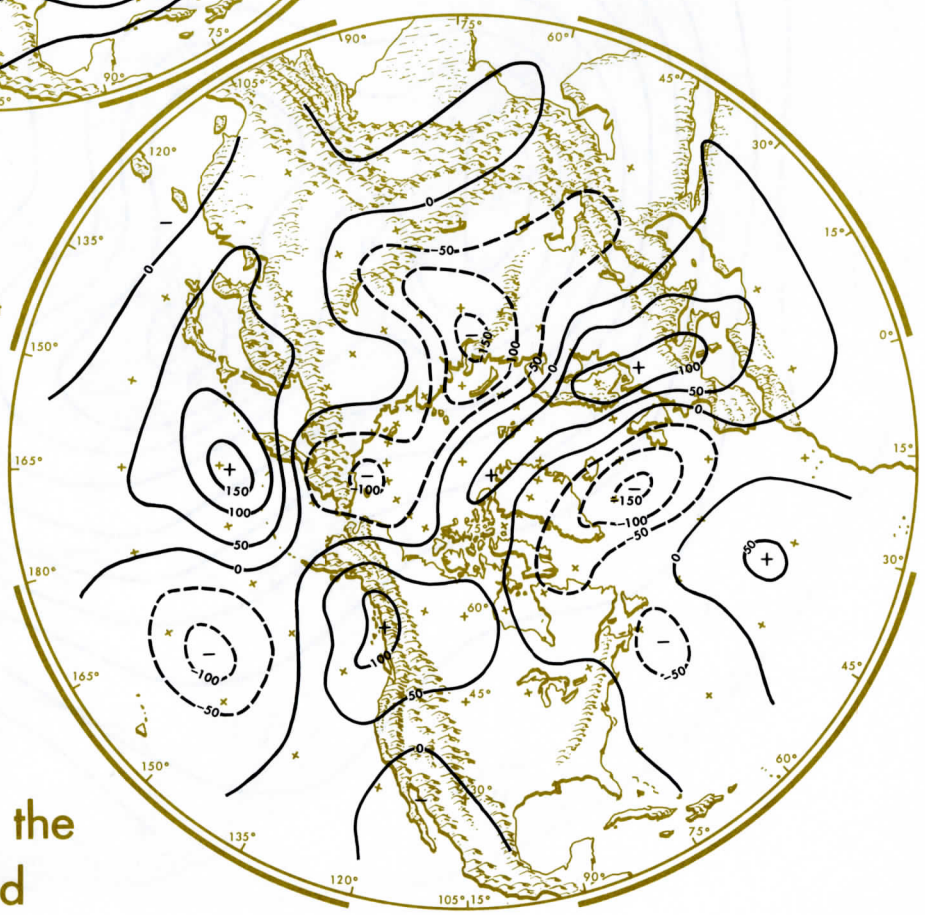
700 millibar
AVERAGE HEIGHT
February 15-19



700 millibar height
STANDARD DEVIATION



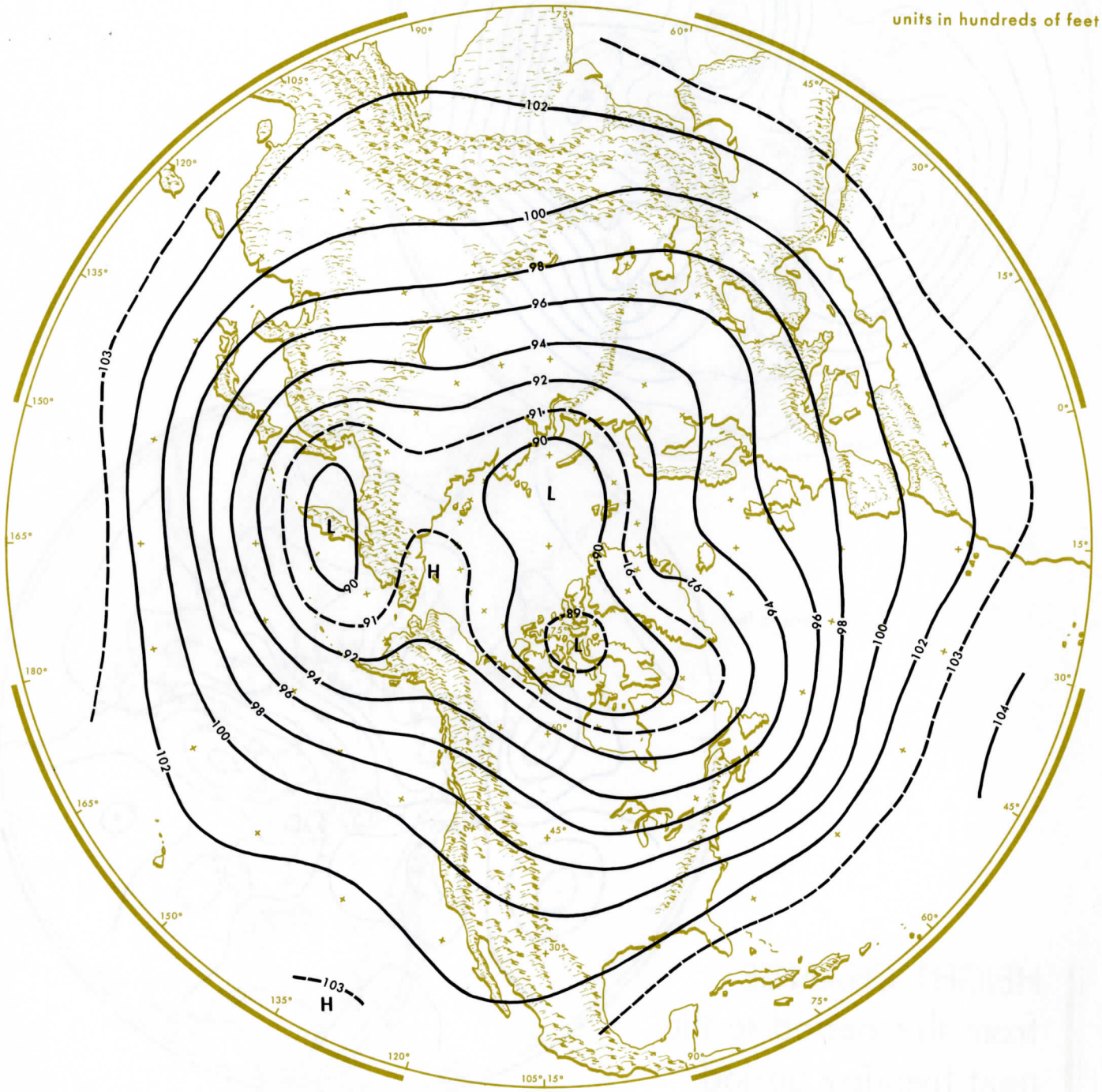
units in feet



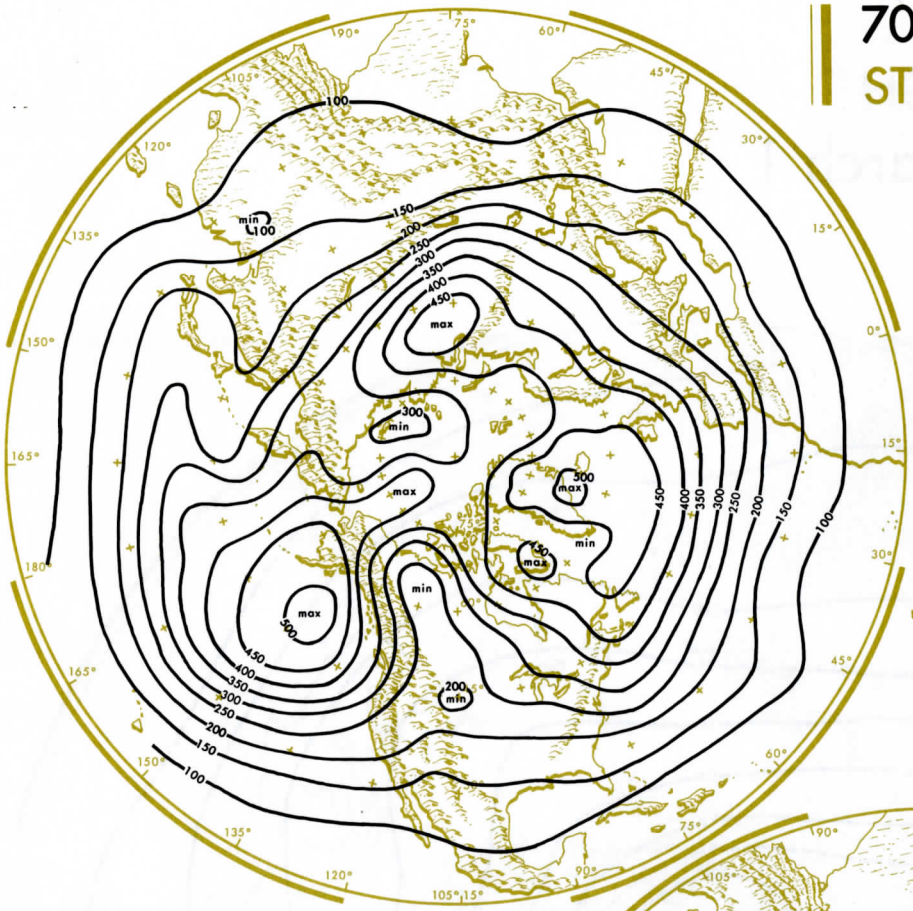
units in feet

HEIGHT CHANGE
from this period to the next five-day period

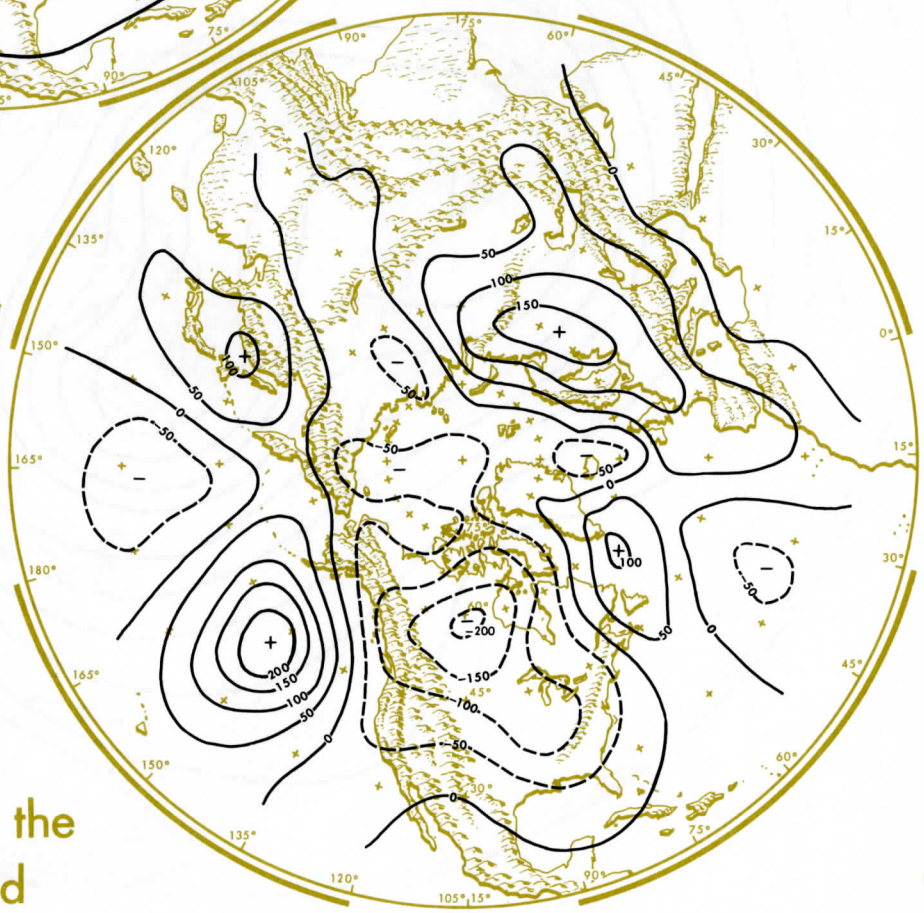
700 millibar
AVERAGE HEIGHT
February 20-24



700 millibar height
STANDARD DEVIATION



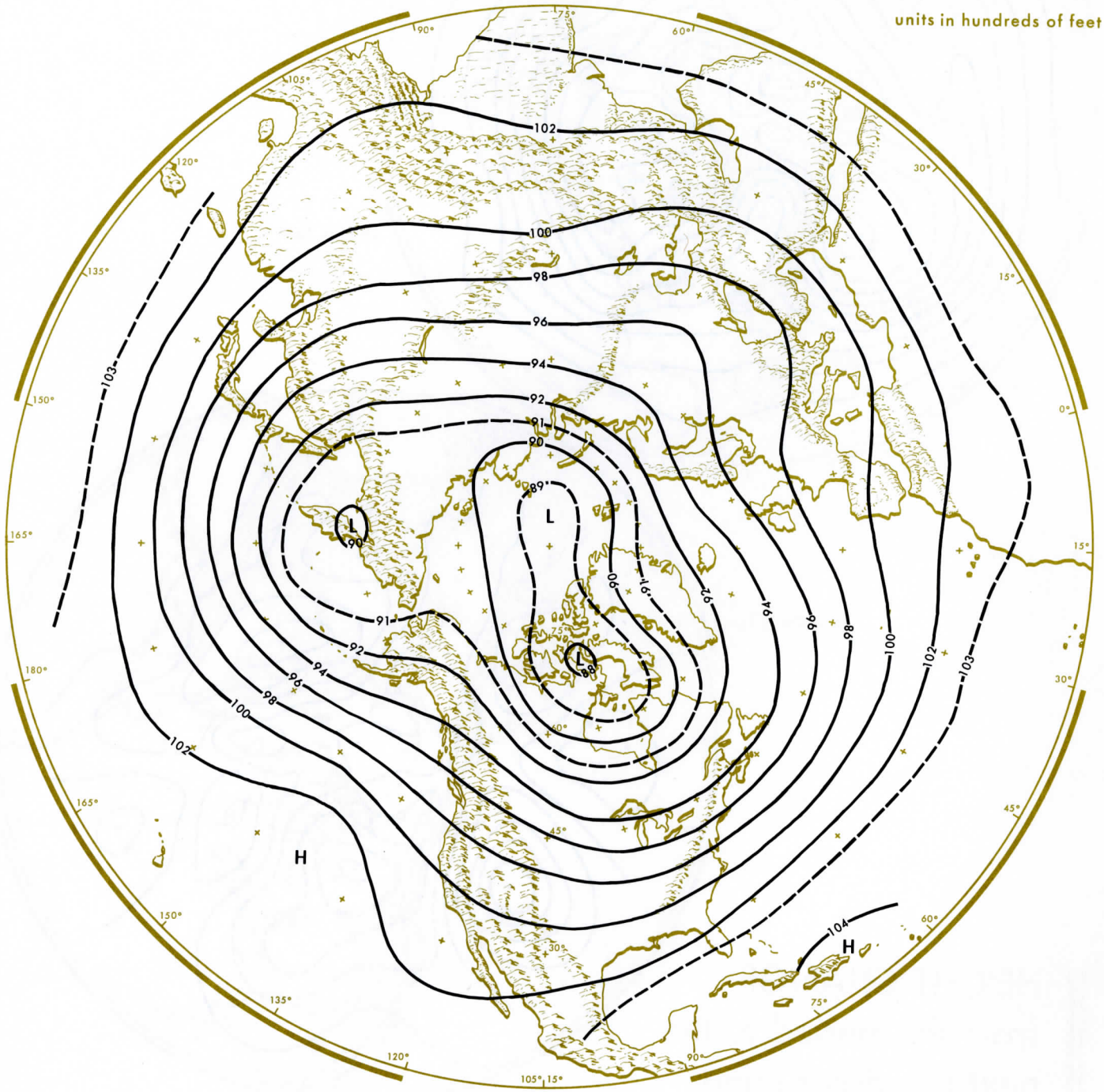
units in feet



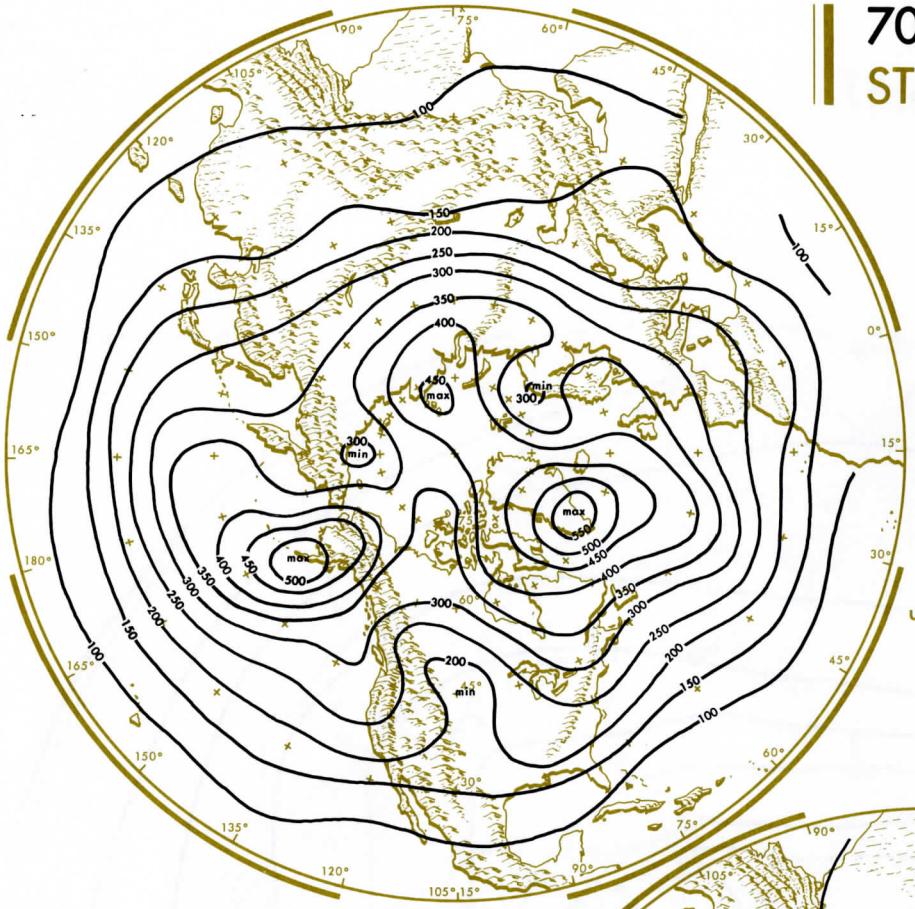
units in feet

HEIGHT CHANGE
from this period to the next five-day period

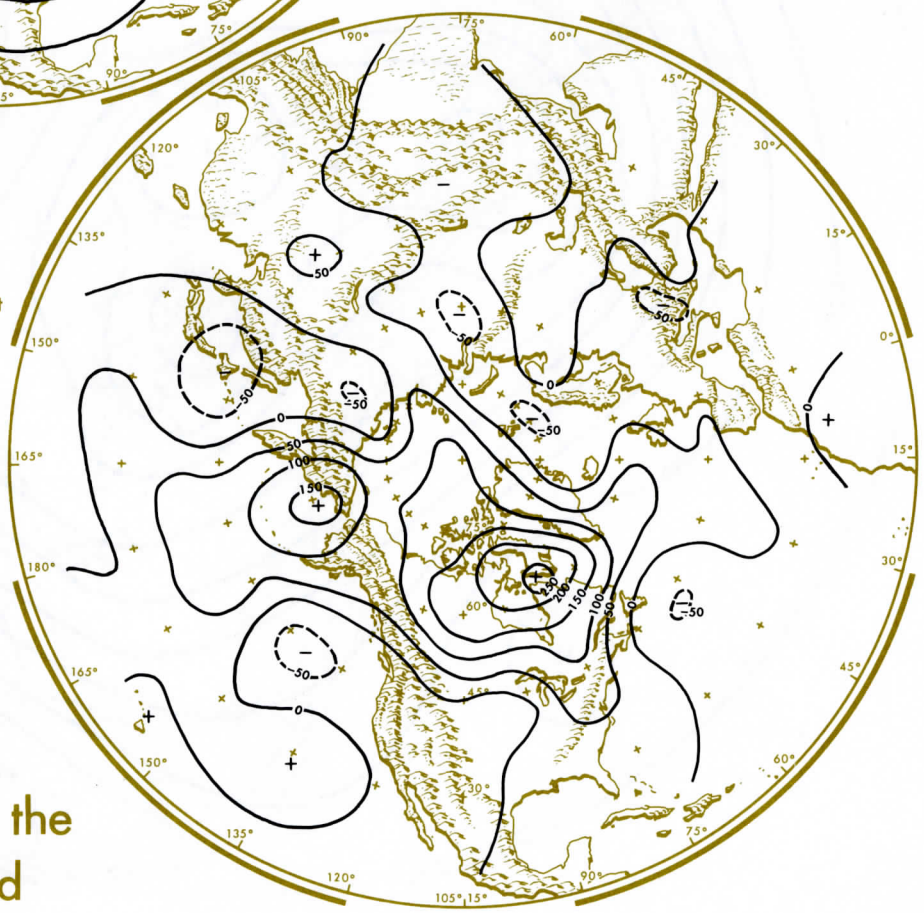
700 millibar
AVERAGE HEIGHT
February 25-March 1



700 millibar height
STANDARD DEVIATION



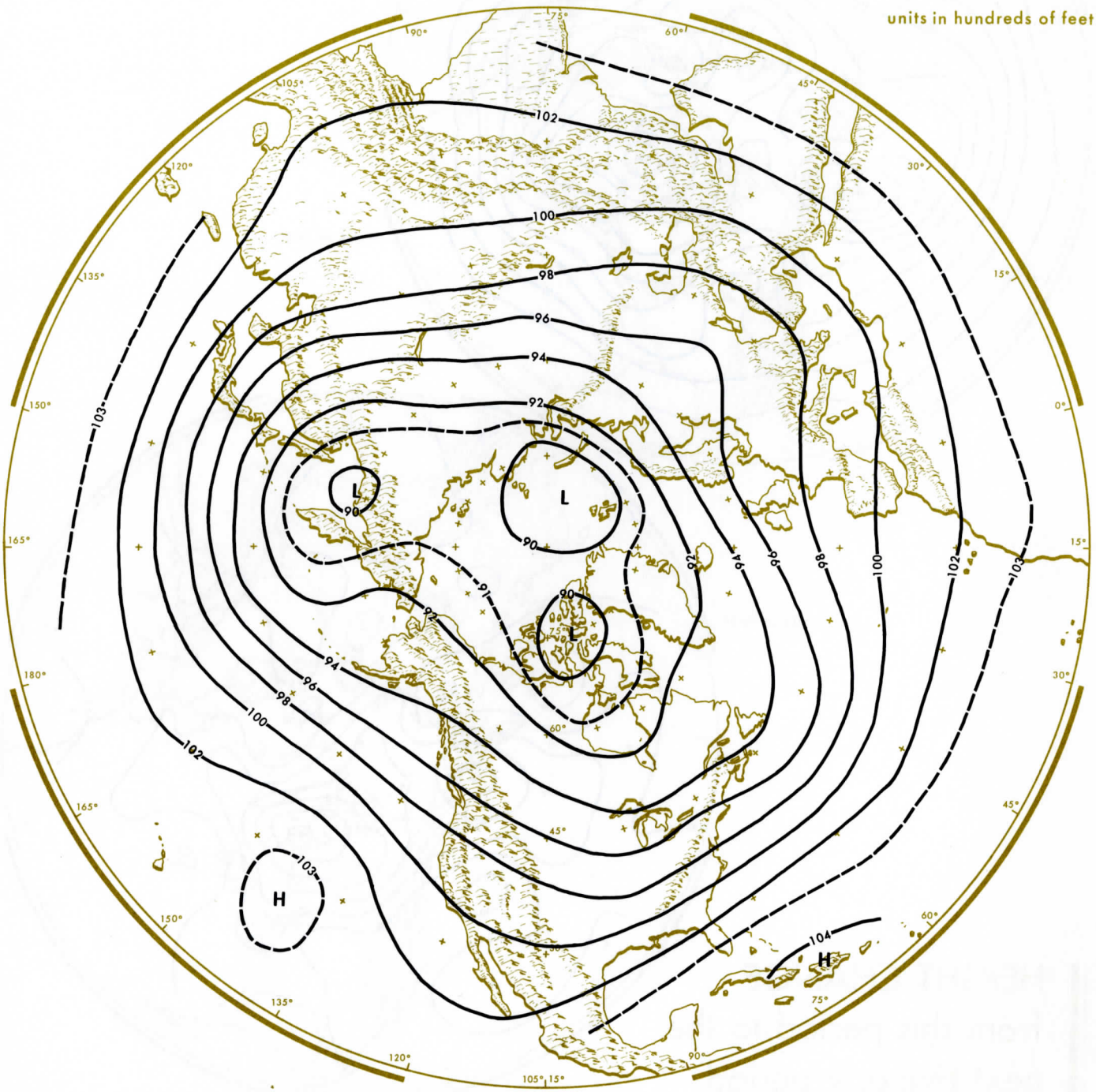
units in feet



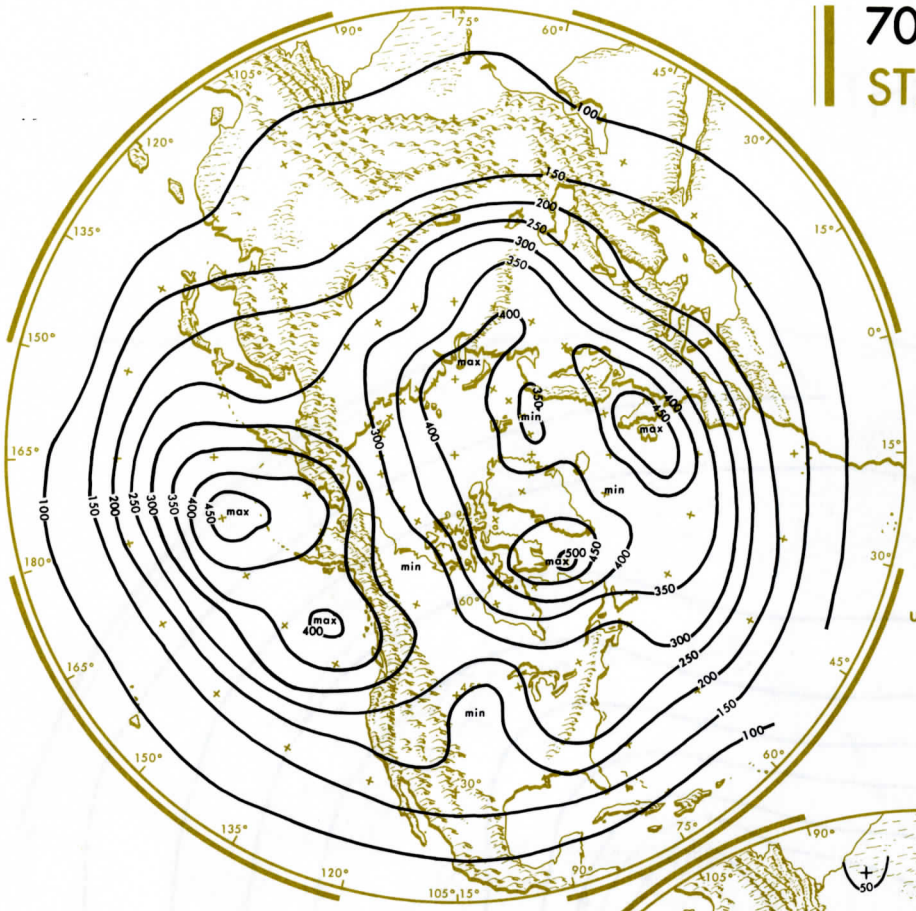
units in feet

HEIGHT CHANGE
from this period to the next five-day period

700 millibar
AVERAGE HEIGHT
March 2-6



700 millibar height
STANDARD DEVIATION

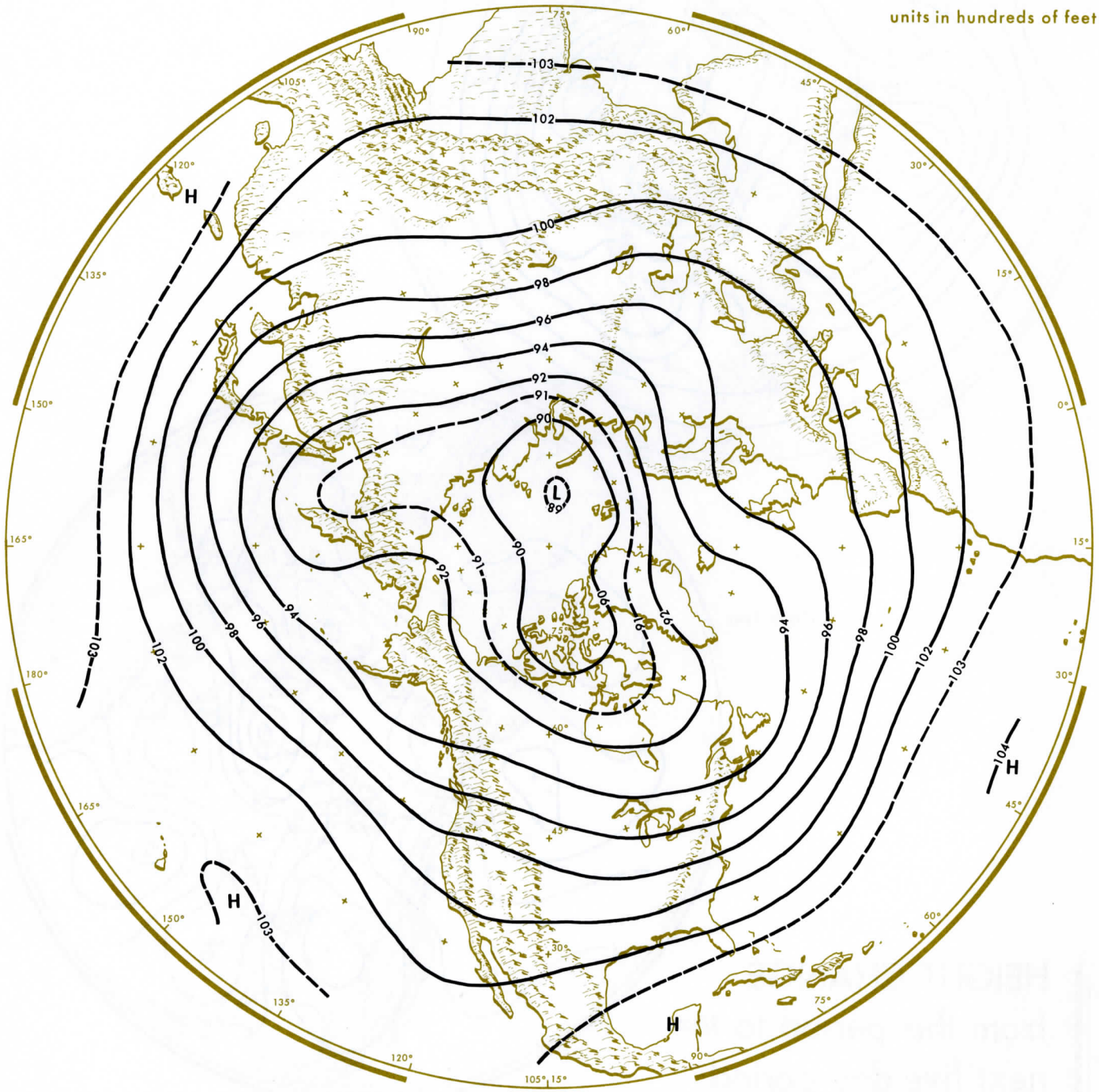


units in feet

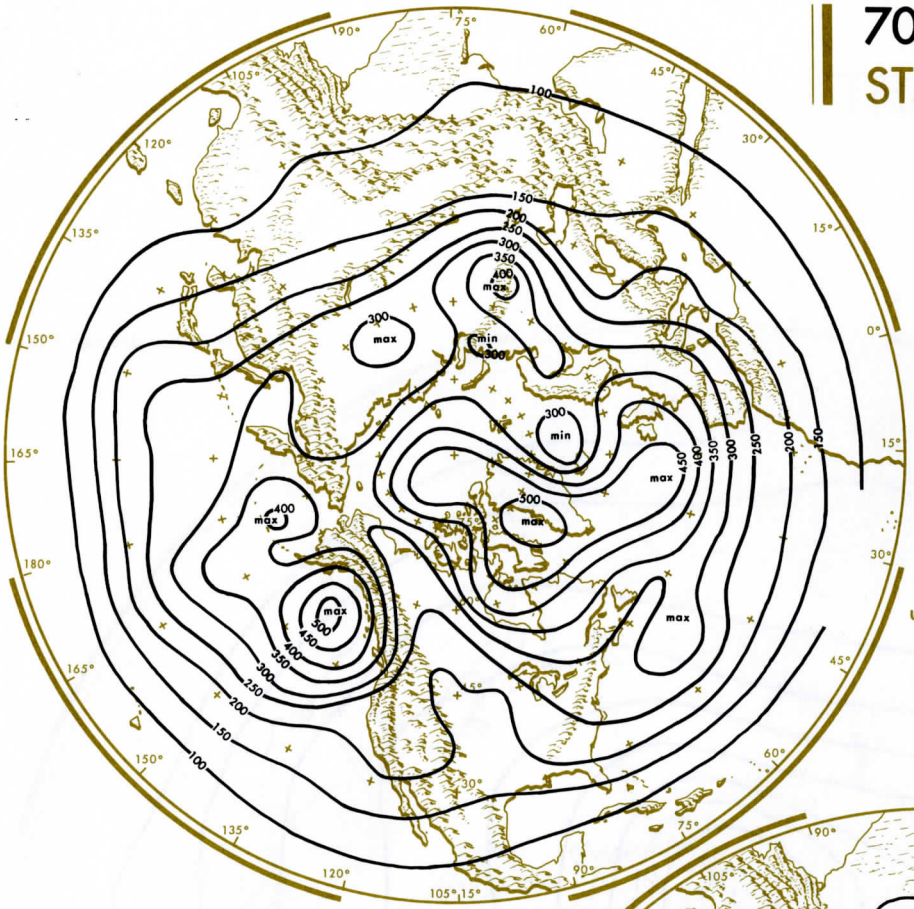
units in feet

HEIGHT CHANGE
from this period to the next five-day period

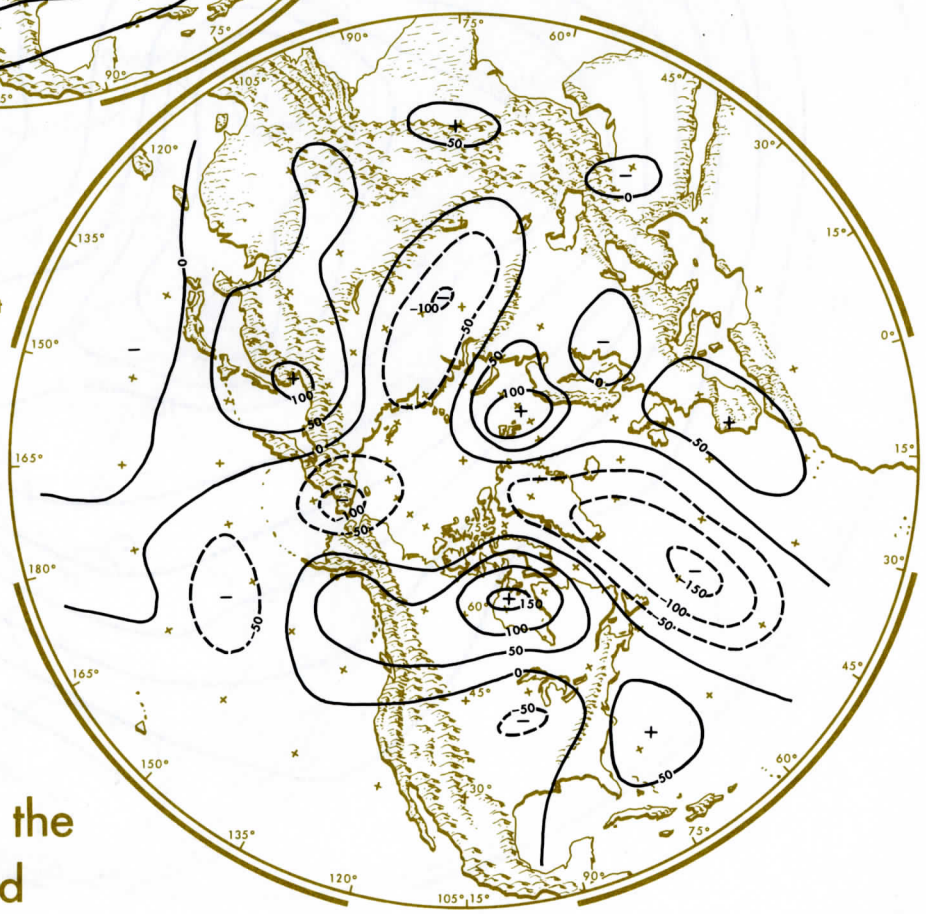
700 millibar
AVERAGE HEIGHT
March 7-11



700 millibar height
STANDARD DEVIATION



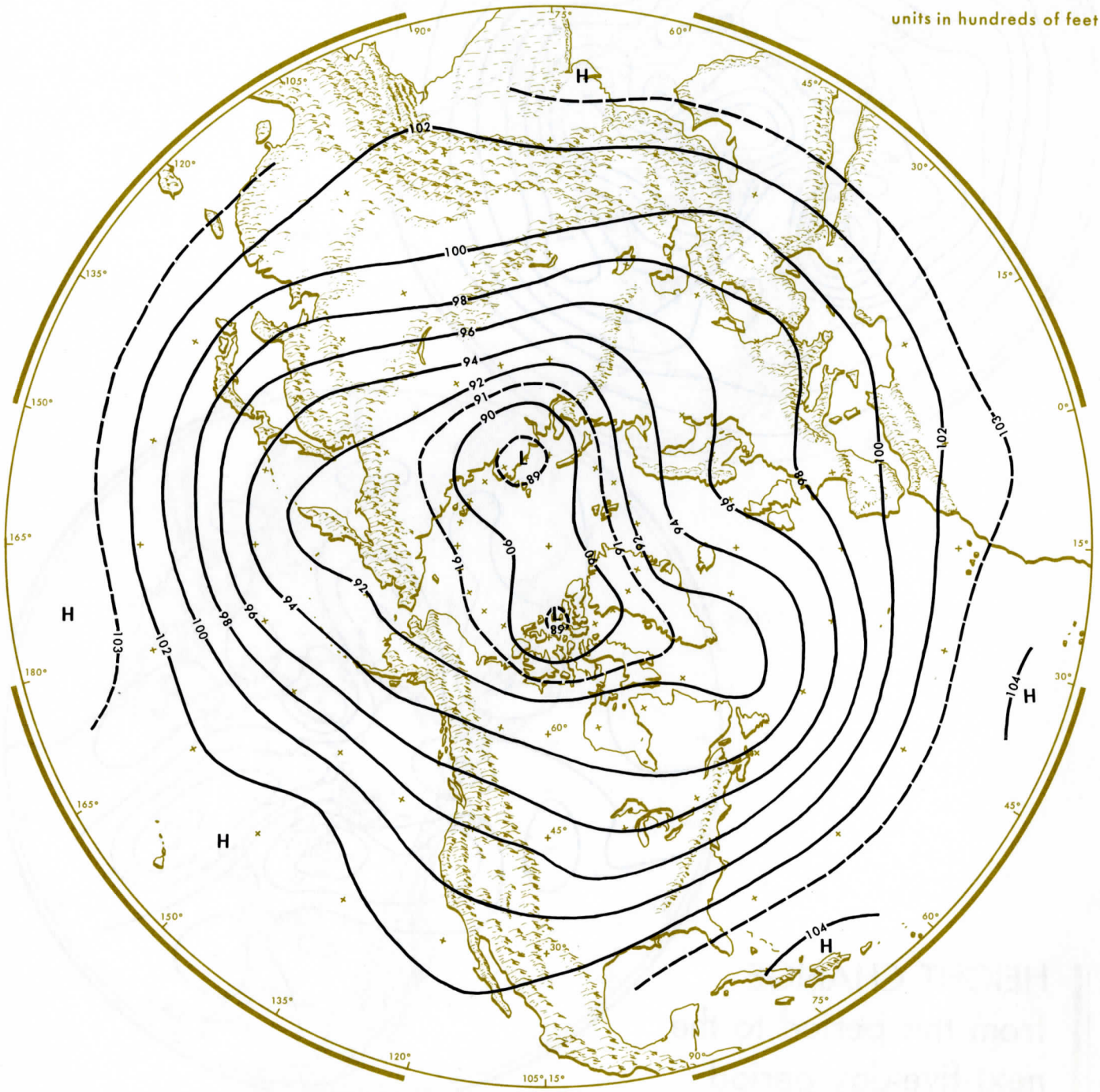
units in feet



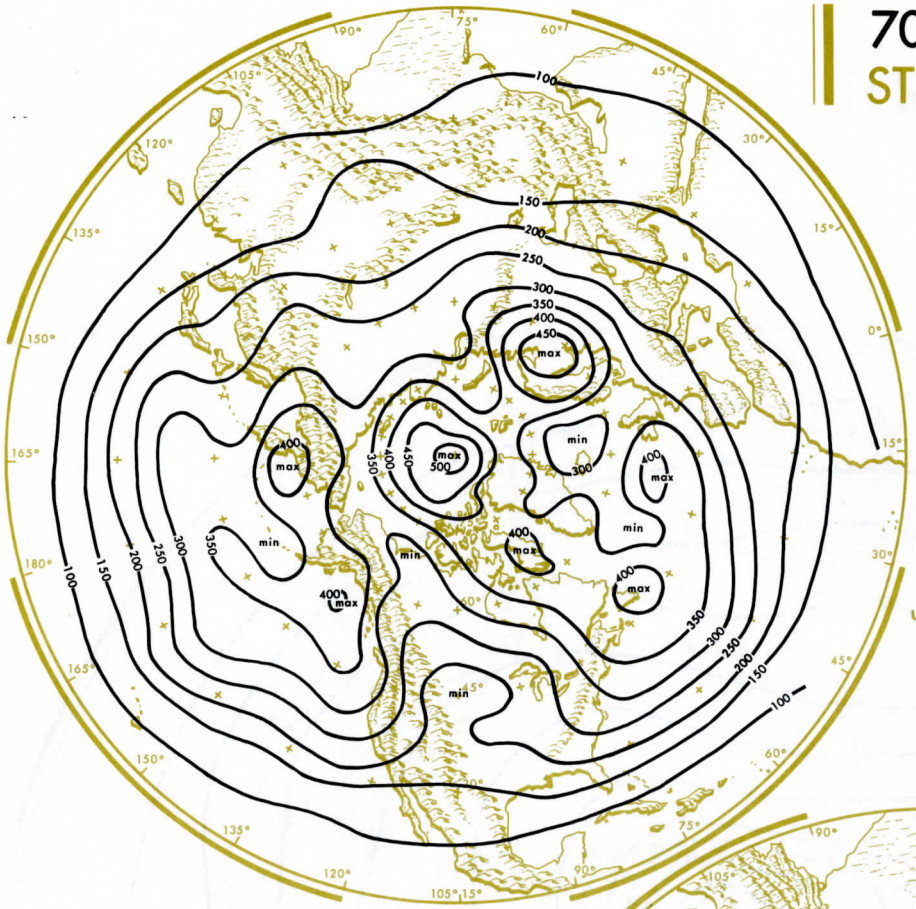
units in feet

HEIGHT CHANGE
from this period to the next five-day period

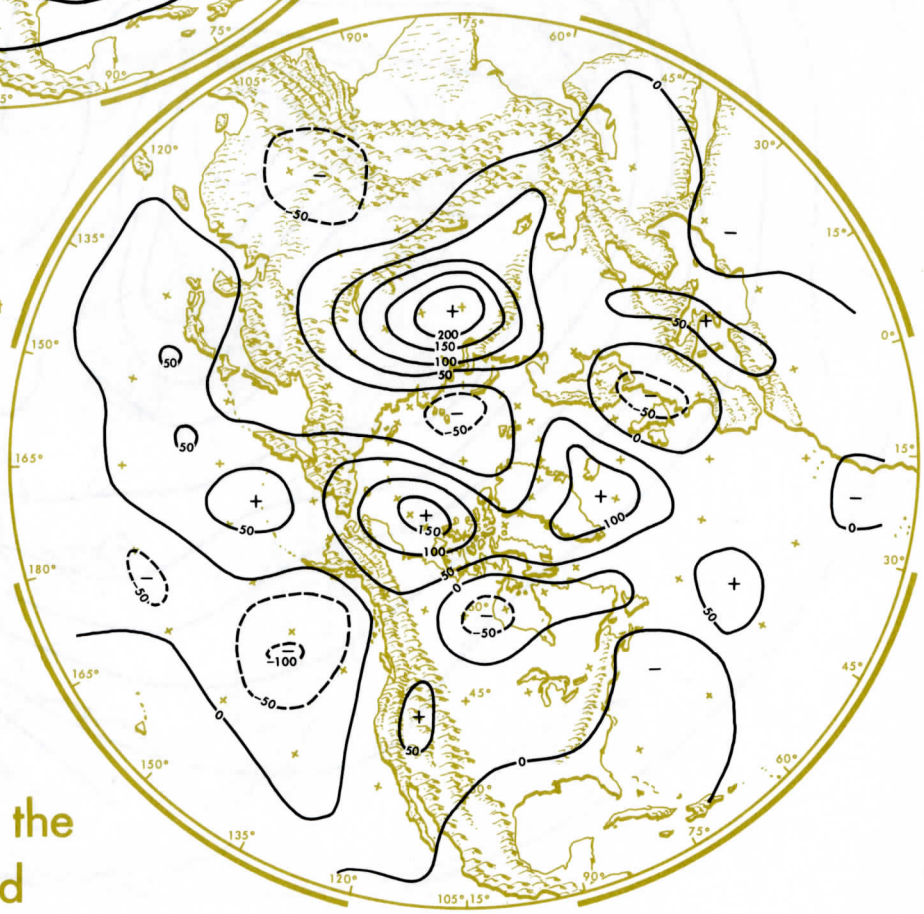
700 millibar
AVERAGE HEIGHT
March 12-16



700 millibar height
STANDARD DEVIATION



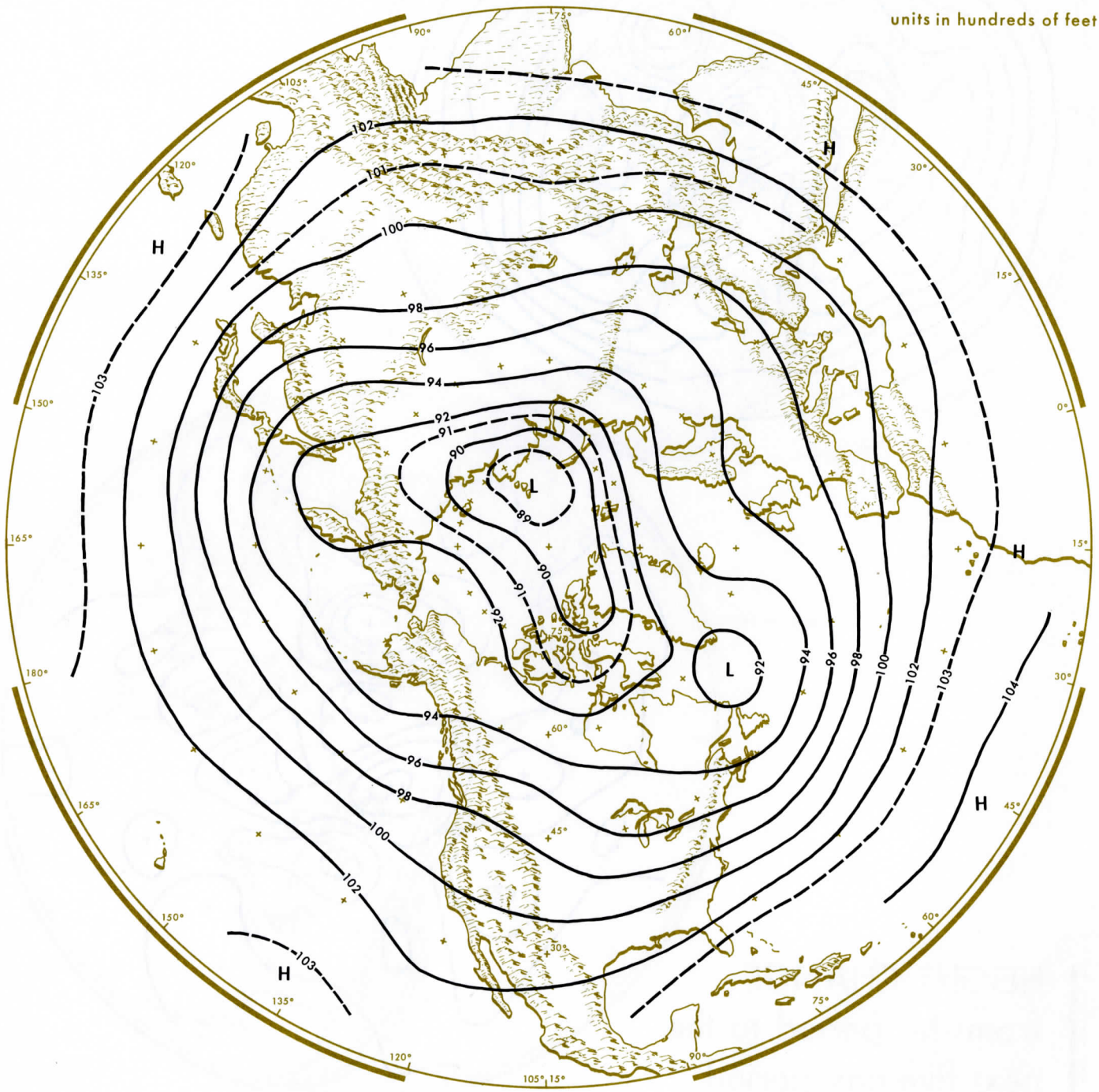
units in feet



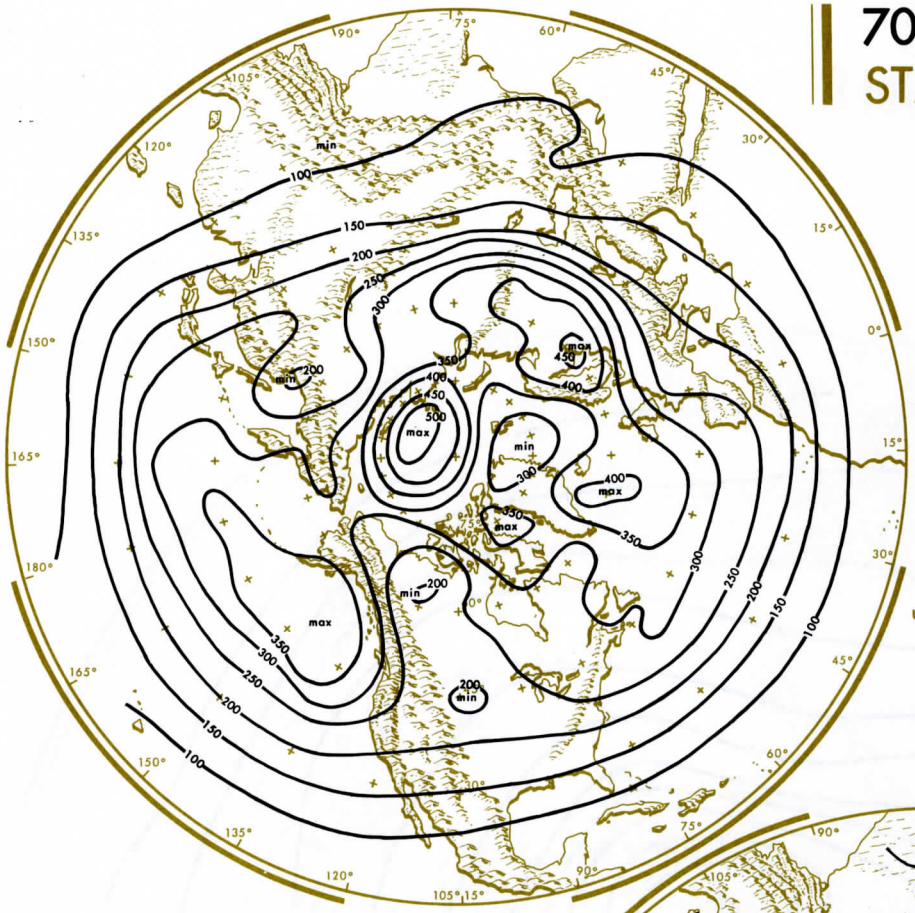
units in feet

HEIGHT CHANGE
from this period to the next five-day period

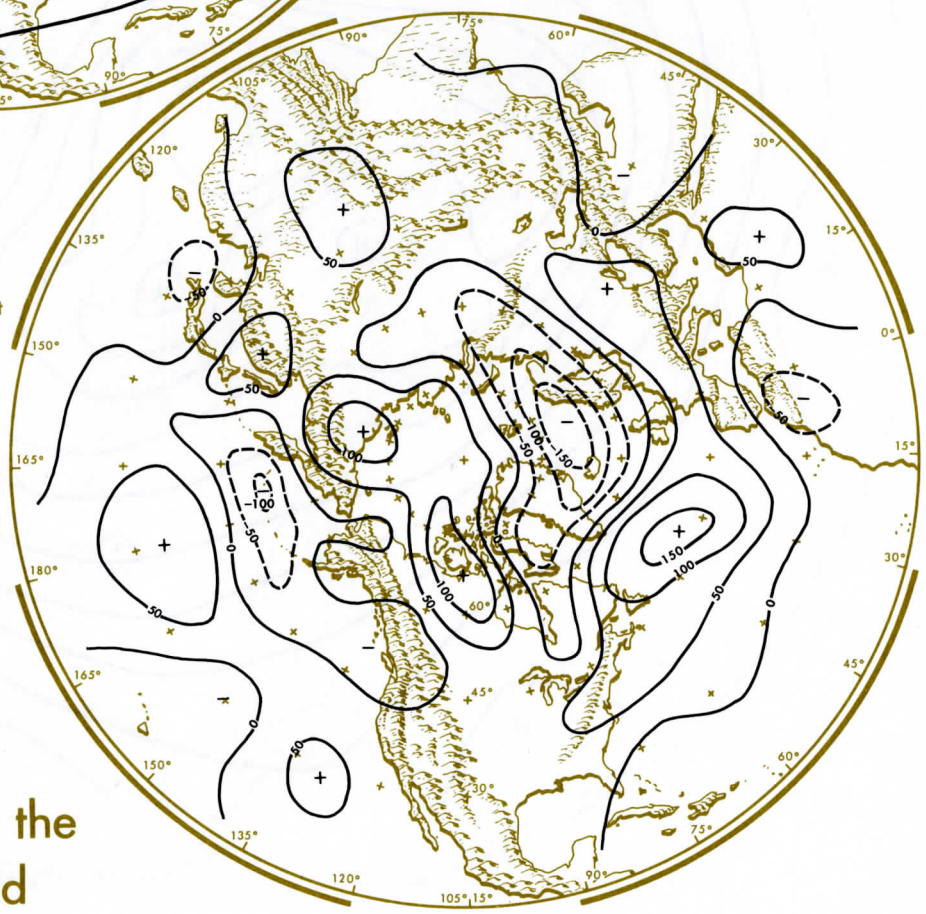
700 millibar
AVERAGE HEIGHT
March 17-21



700 millibar height
STANDARD DEVIATION



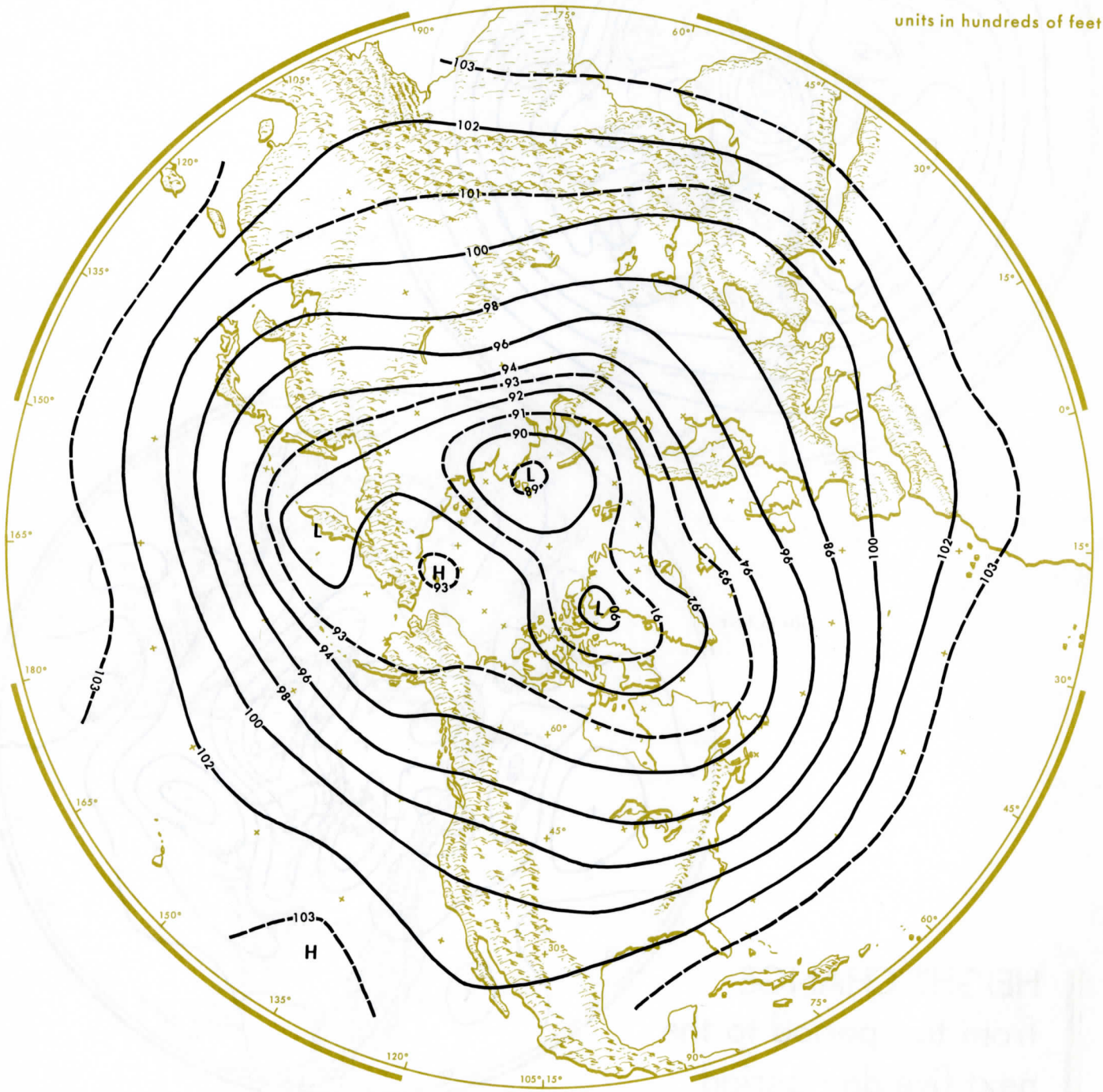
units in feet



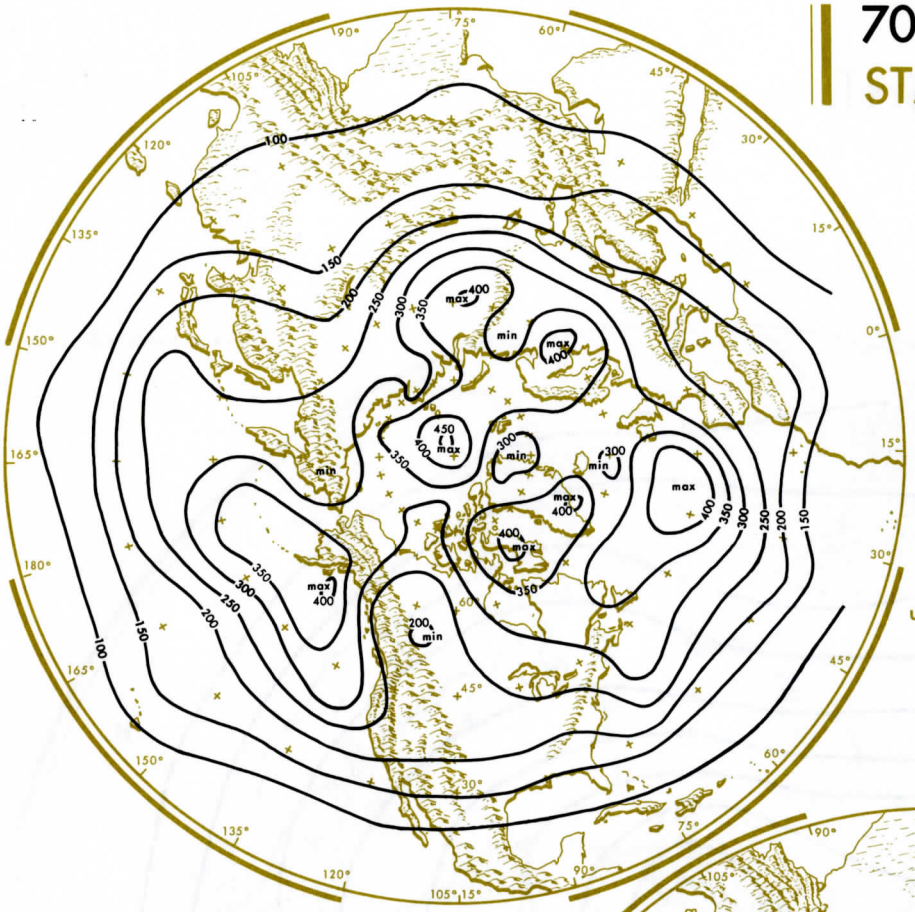
units in feet

HEIGHT CHANGE
from this period to the next five-day period

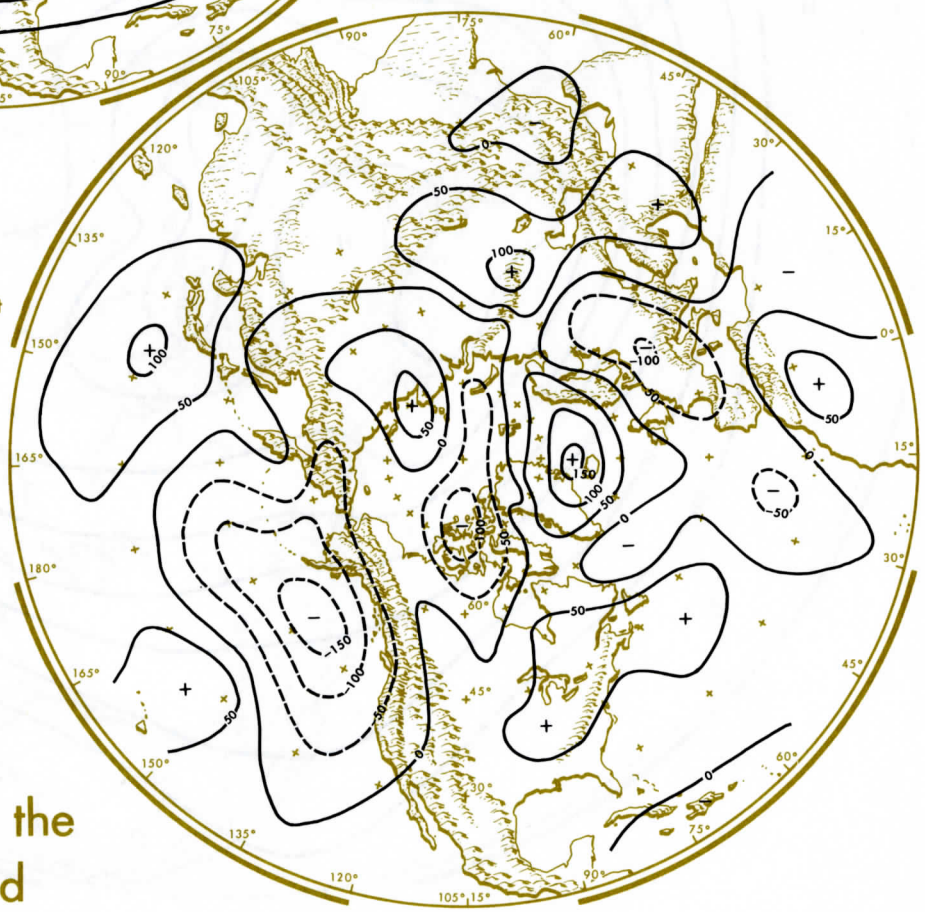
700 millibar
AVERAGE HEIGHT
March 22-26



700 millibar height
STANDARD DEVIATION



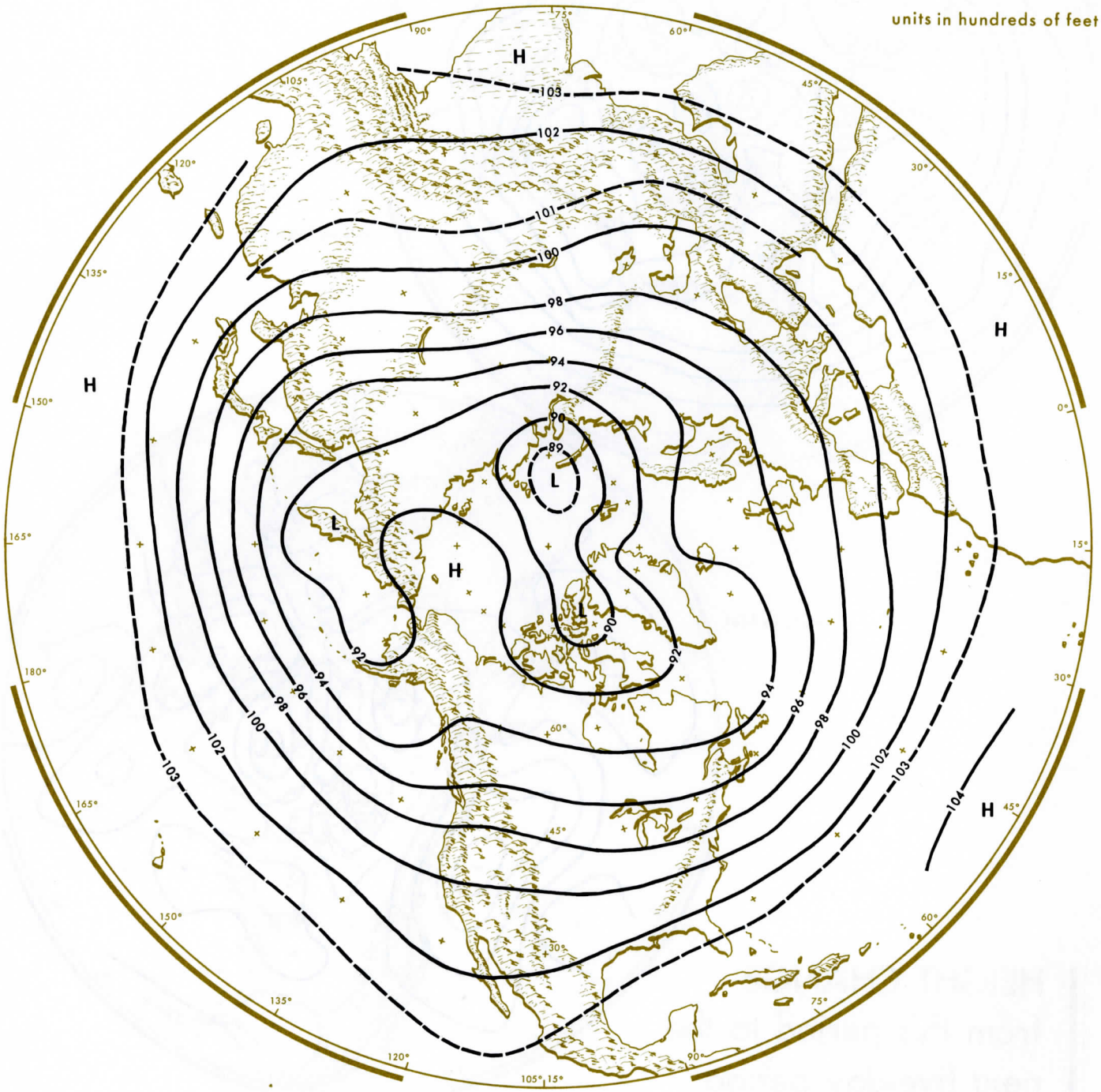
units in feet



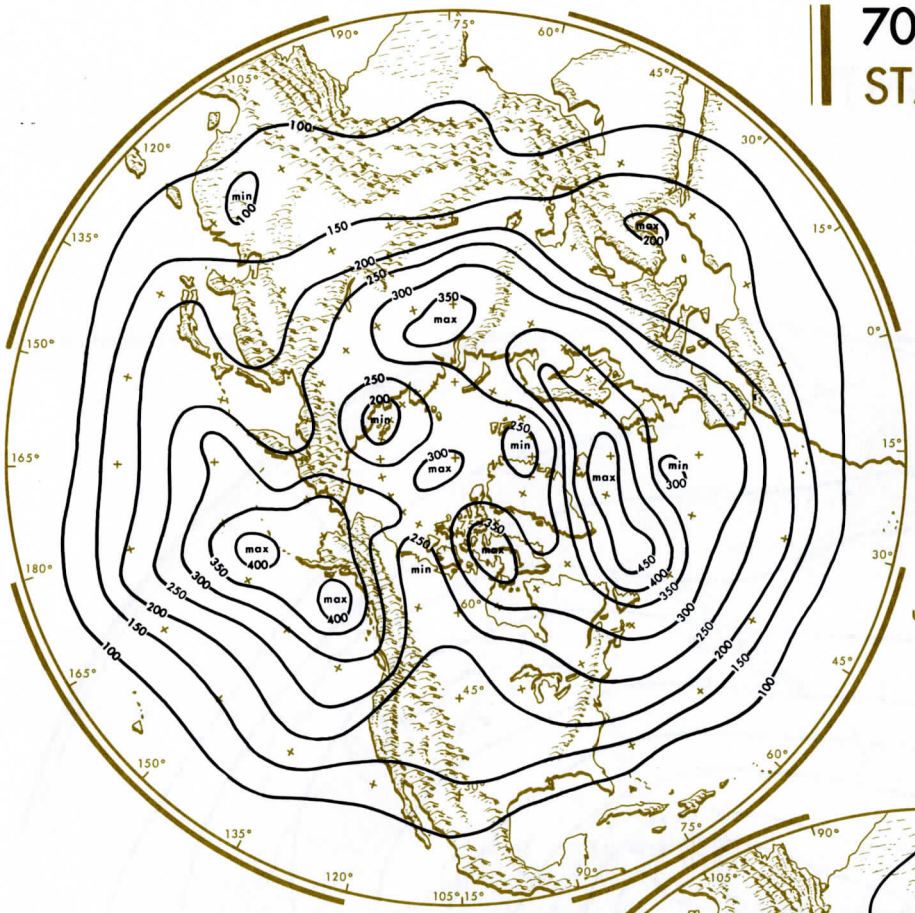
units in feet

HEIGHT CHANGE
from this period to the next five-day period

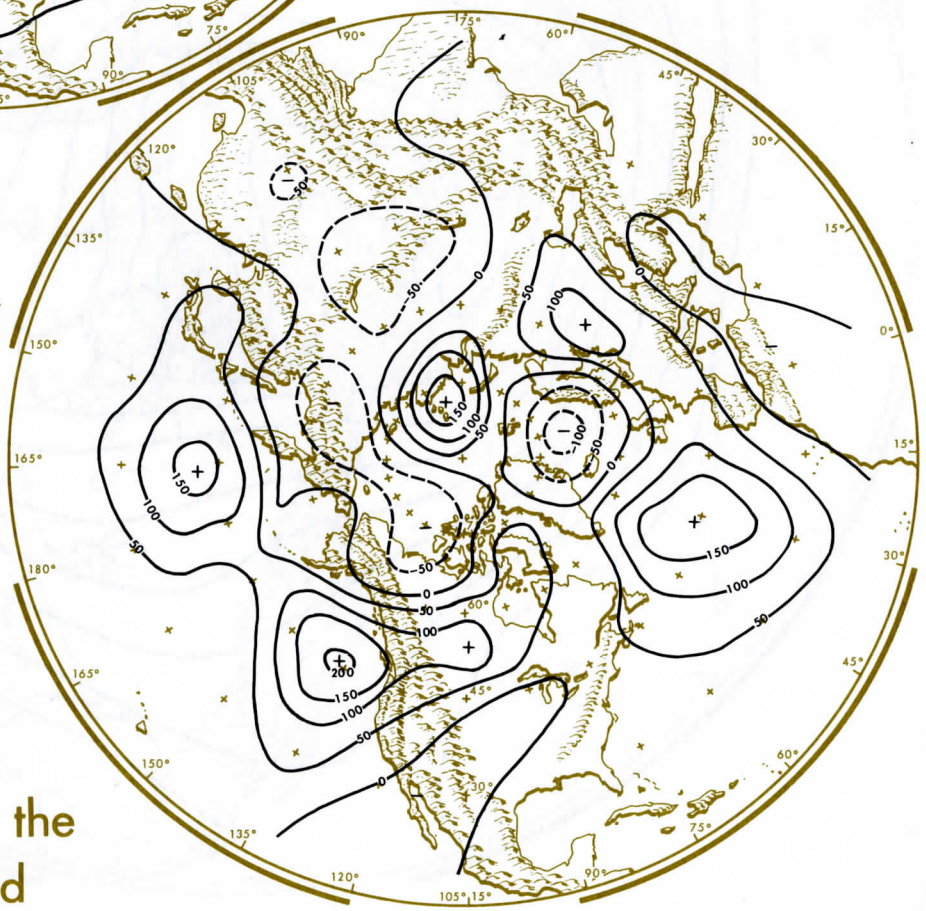
700 millibar
AVERAGE HEIGHT
March 27-31



700 millibar height
STANDARD DEVIATION



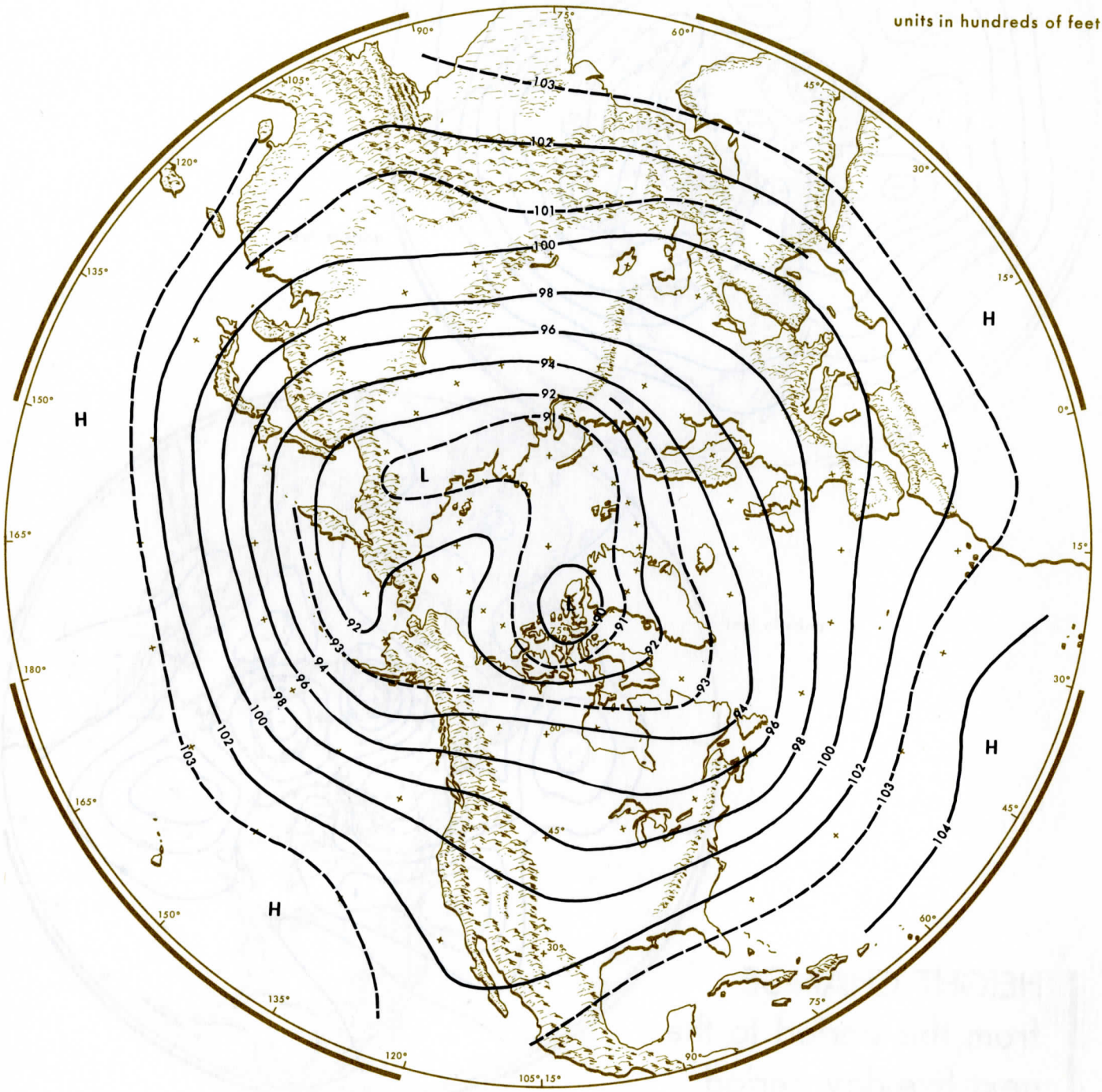
units in feet



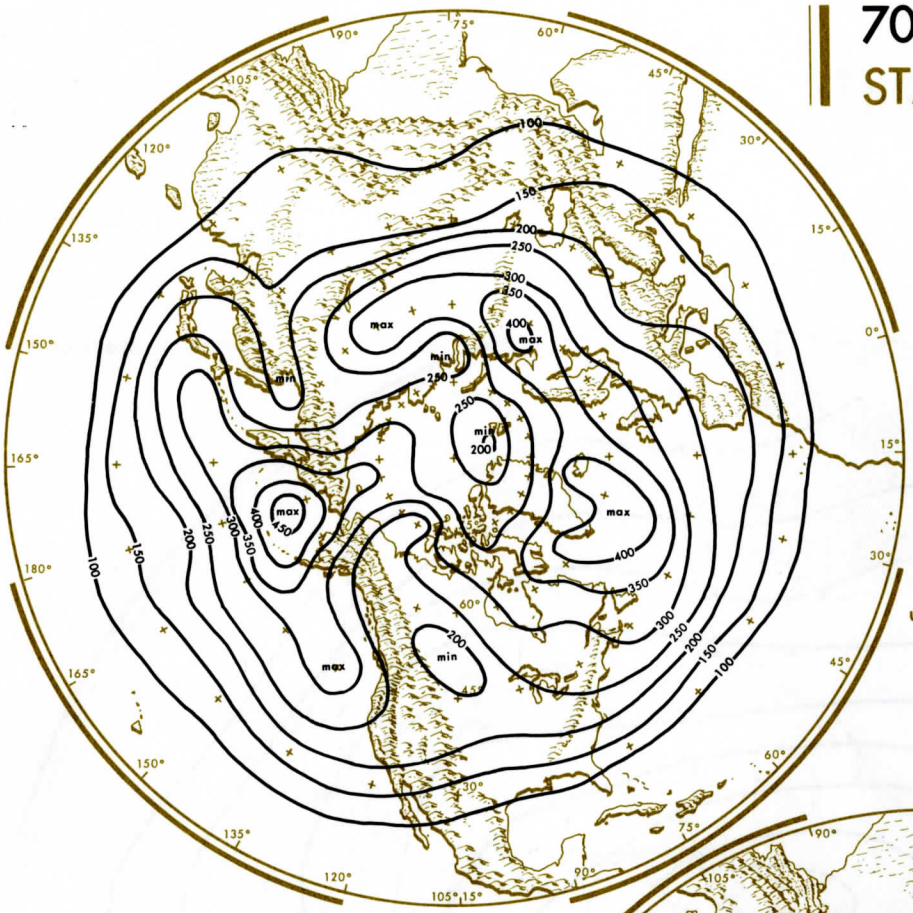
units in feet

HEIGHT CHANGE
from this period to the next five-day period

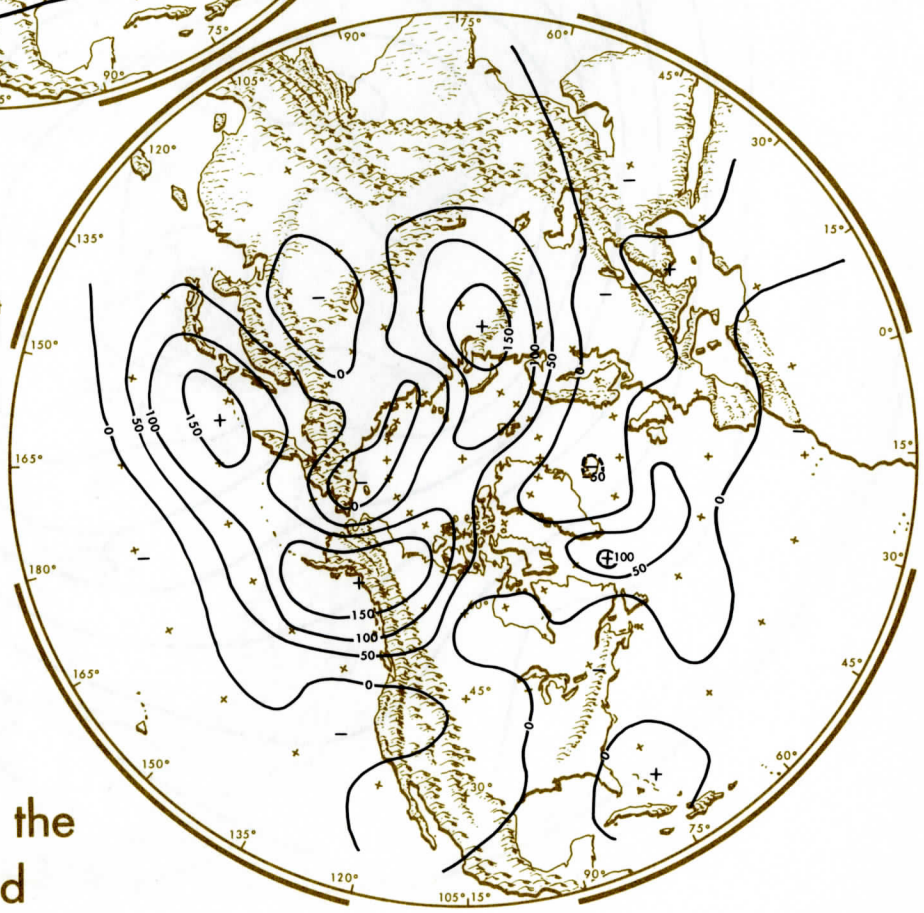
700 millibar
AVERAGE HEIGHT
April 1-5



700 millibar height
STANDARD DEVIATION

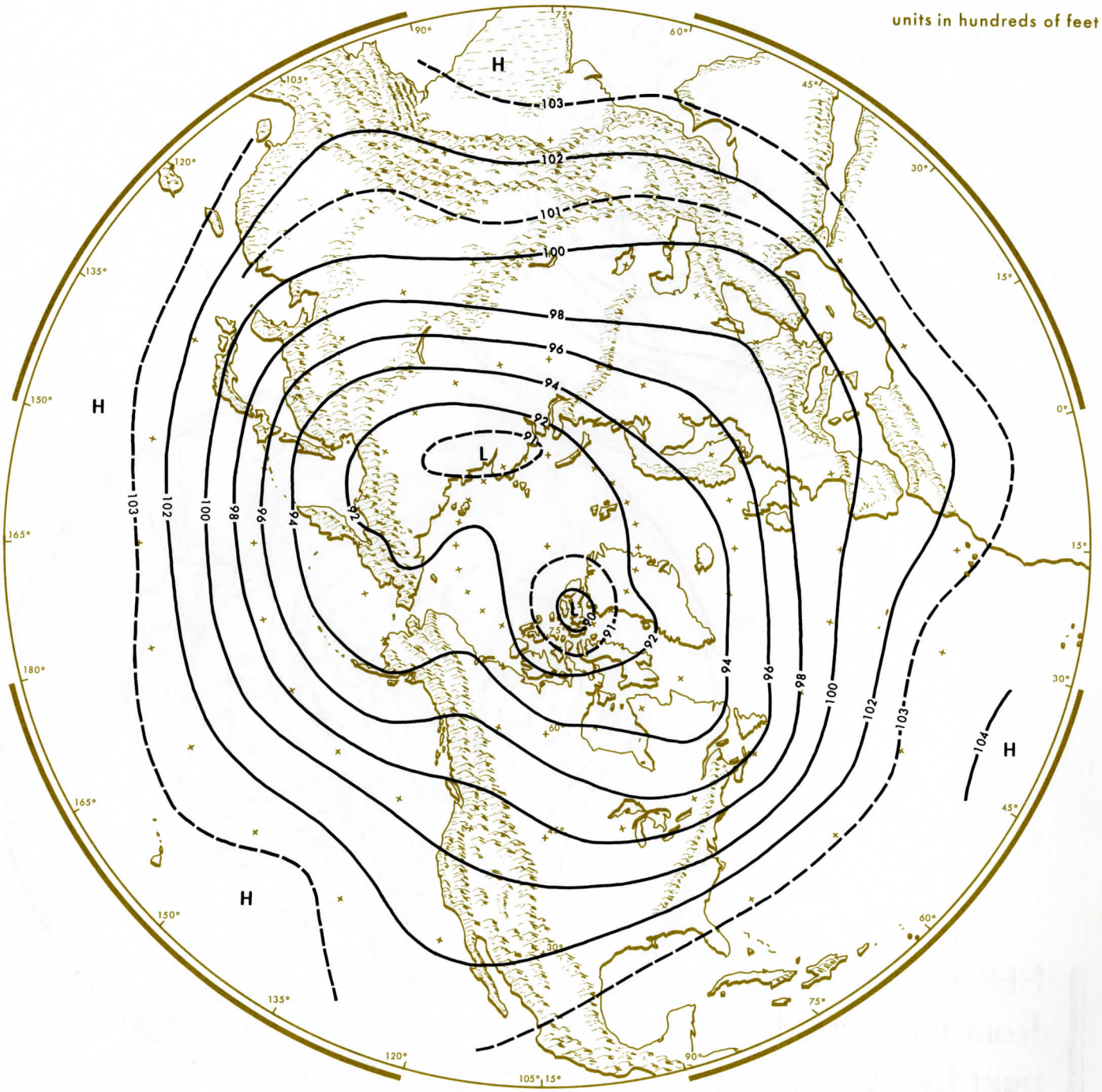


units in feet

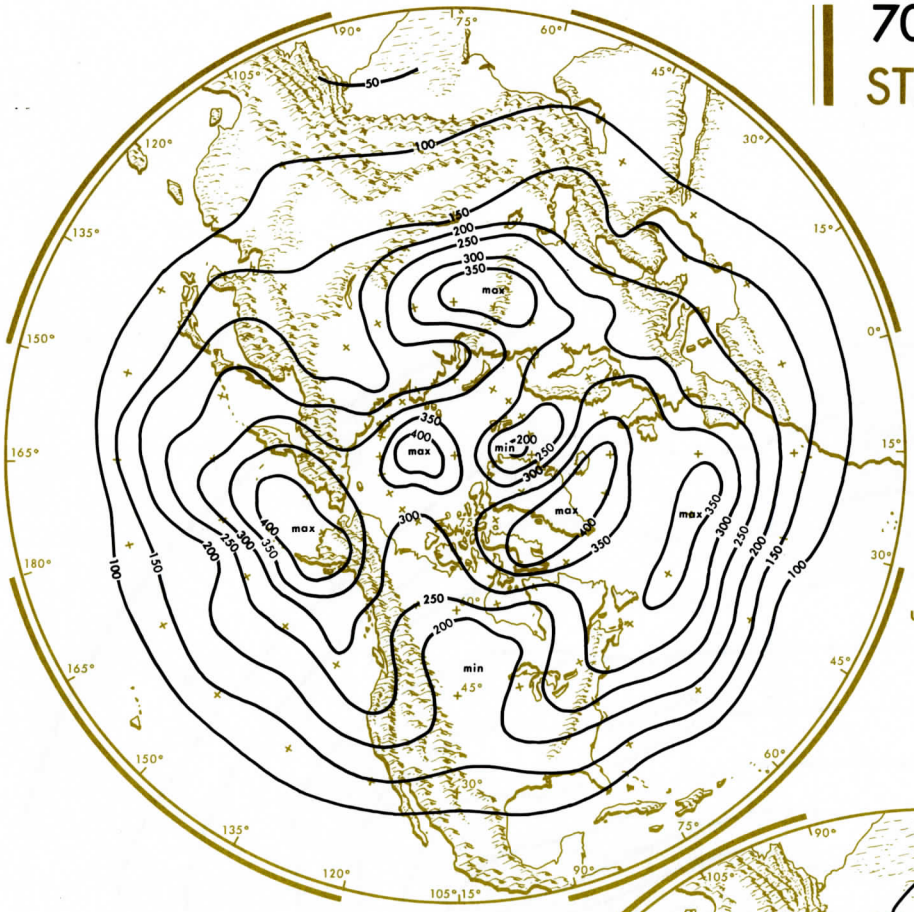


HEIGHT CHANGE
from this period to the next five-day period

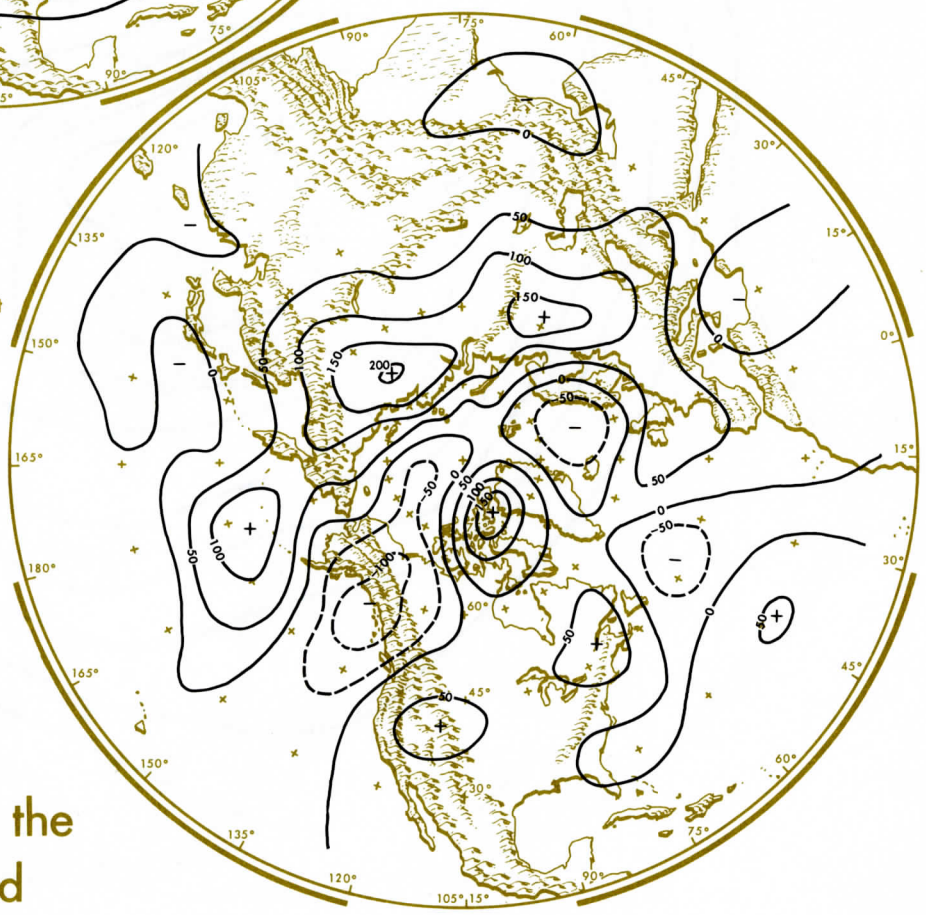
700 millibar
AVERAGE HEIGHT
April 6-10



700 millibar height
STANDARD DEVIATION



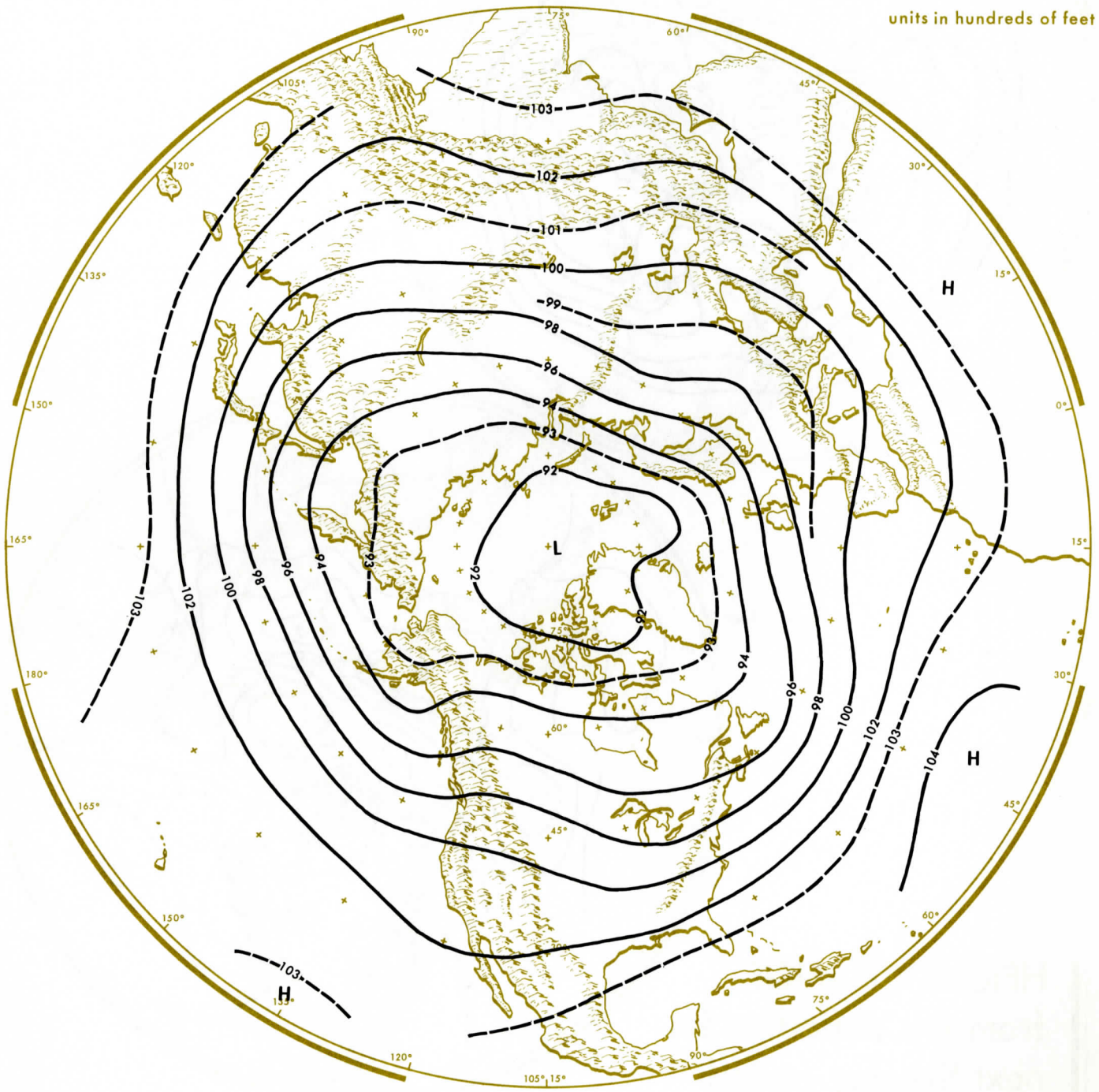
units in feet



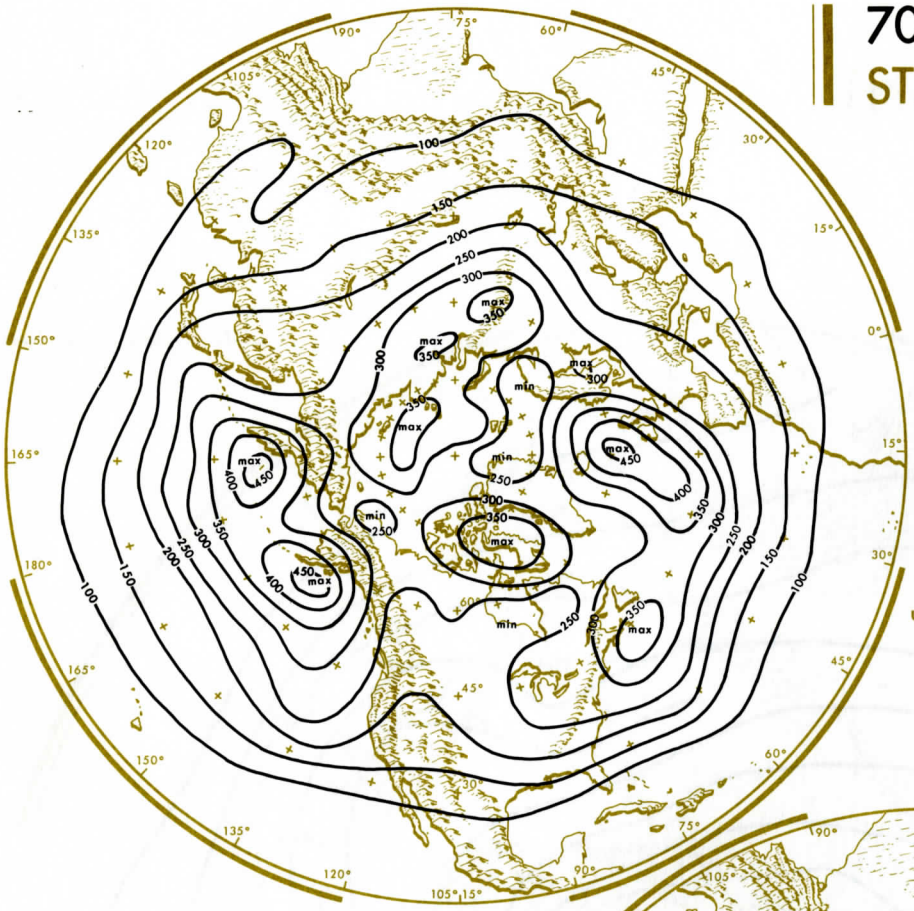
units in feet

HEIGHT CHANGE
from this period to the next five-day period

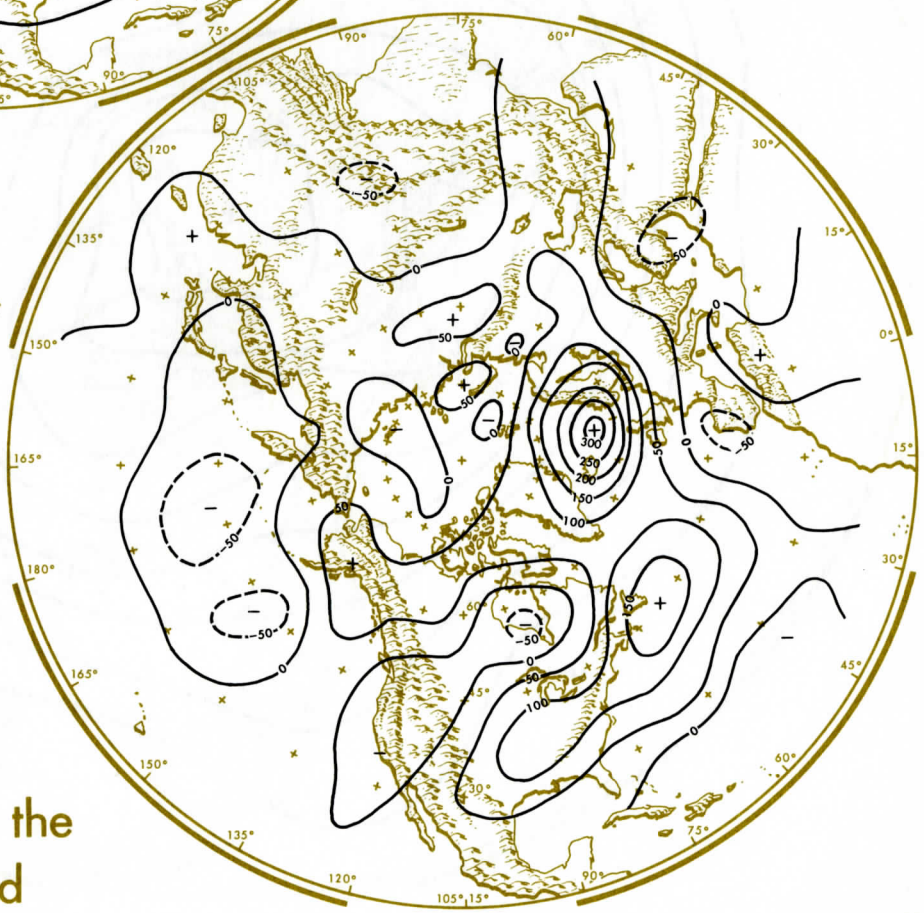
700 millibar
AVERAGE HEIGHT
April 11-15



700 millibar height
STANDARD DEVIATION



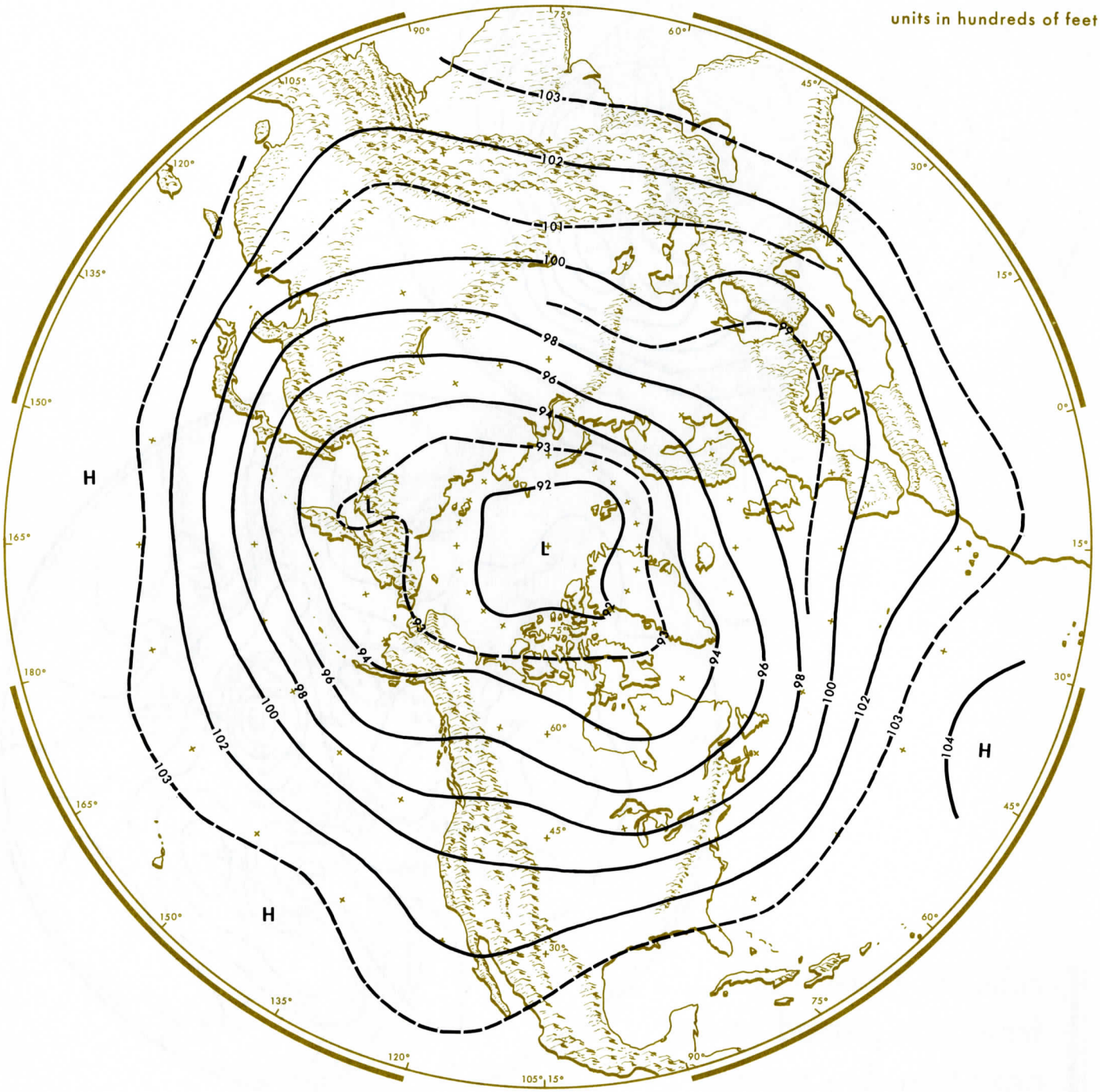
units in feet



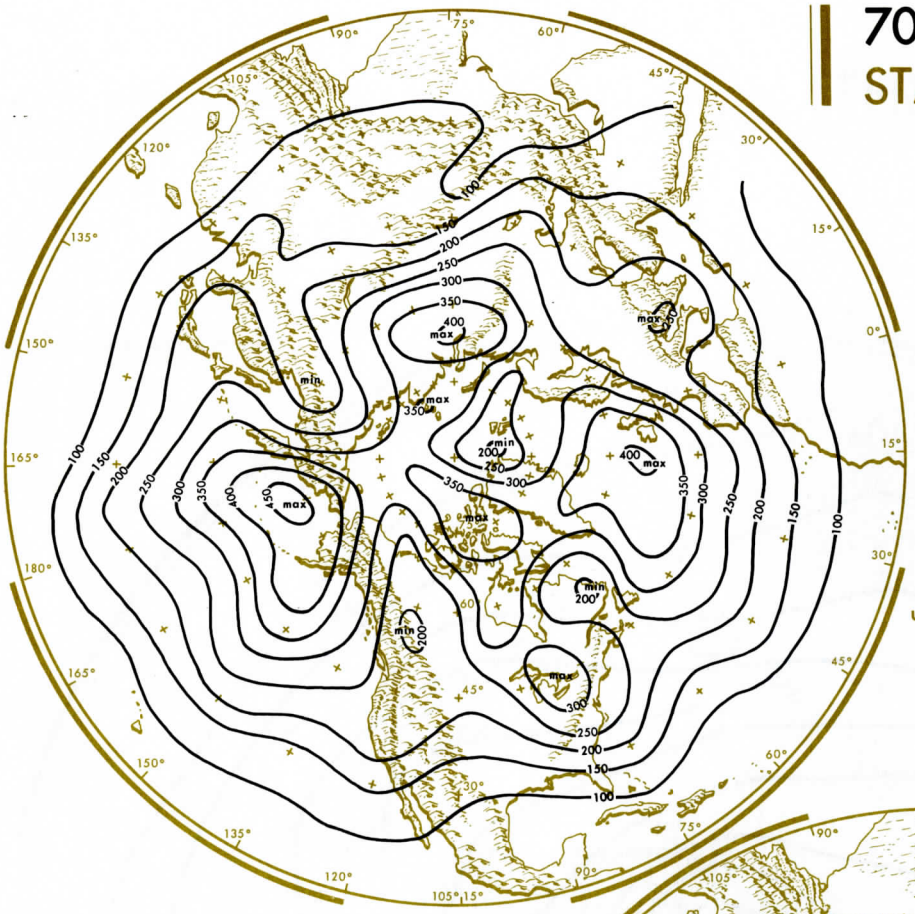
units in feet

HEIGHT CHANGE
from this period to the next five-day period

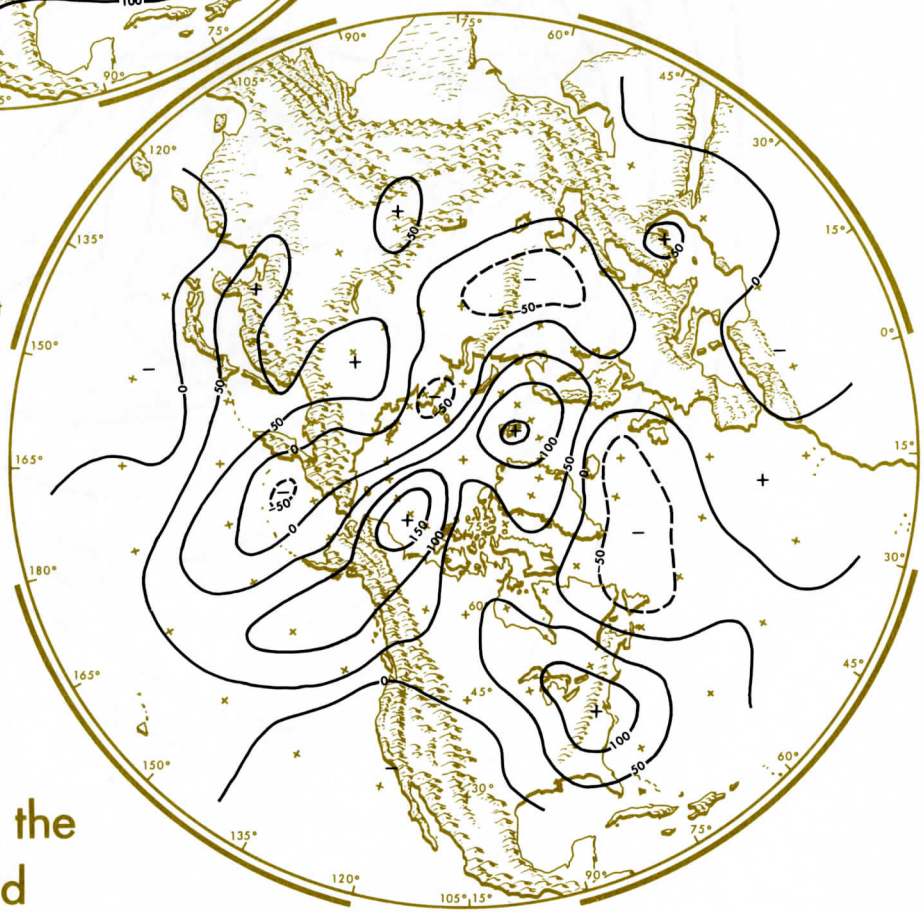
700 millibar
AVERAGE HEIGHT
April 16-20



700 millibar height
STANDARD DEVIATION



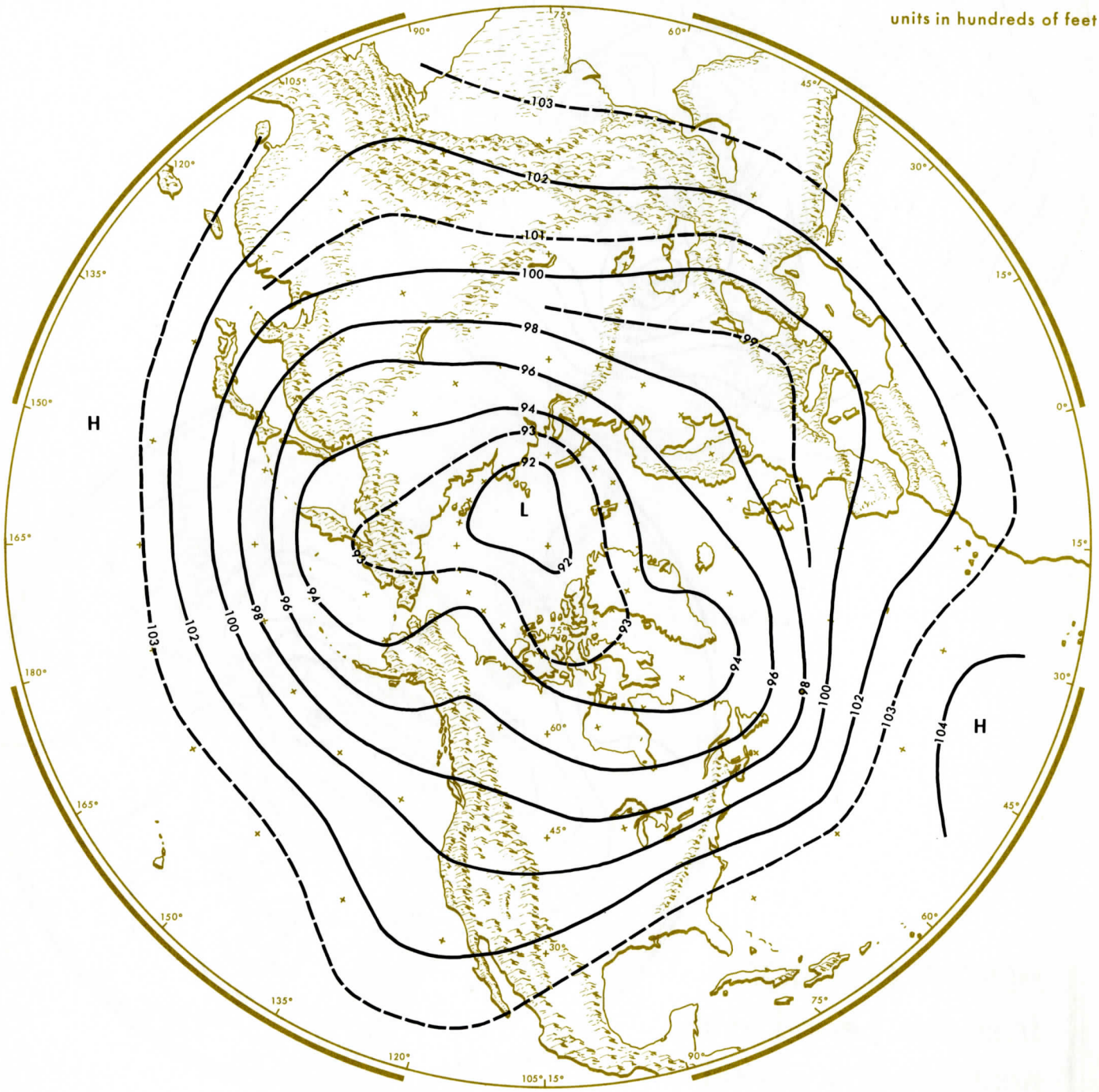
units in feet



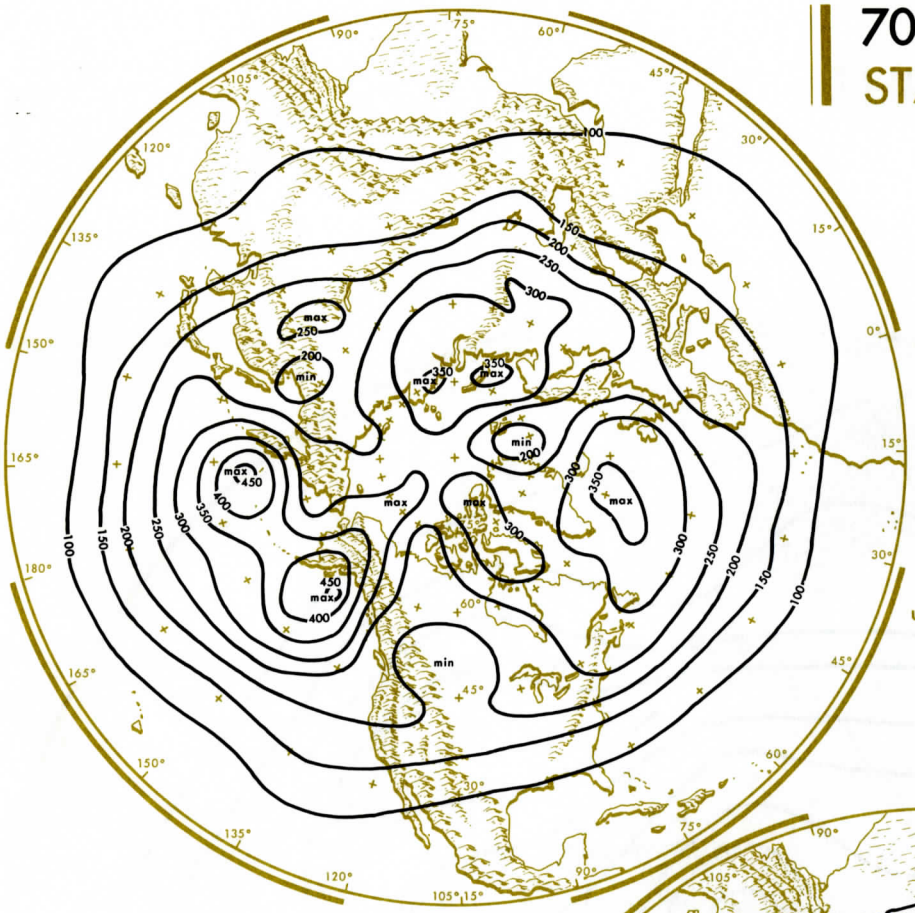
units in feet

HEIGHT CHANGE
from this period to the next five-day period

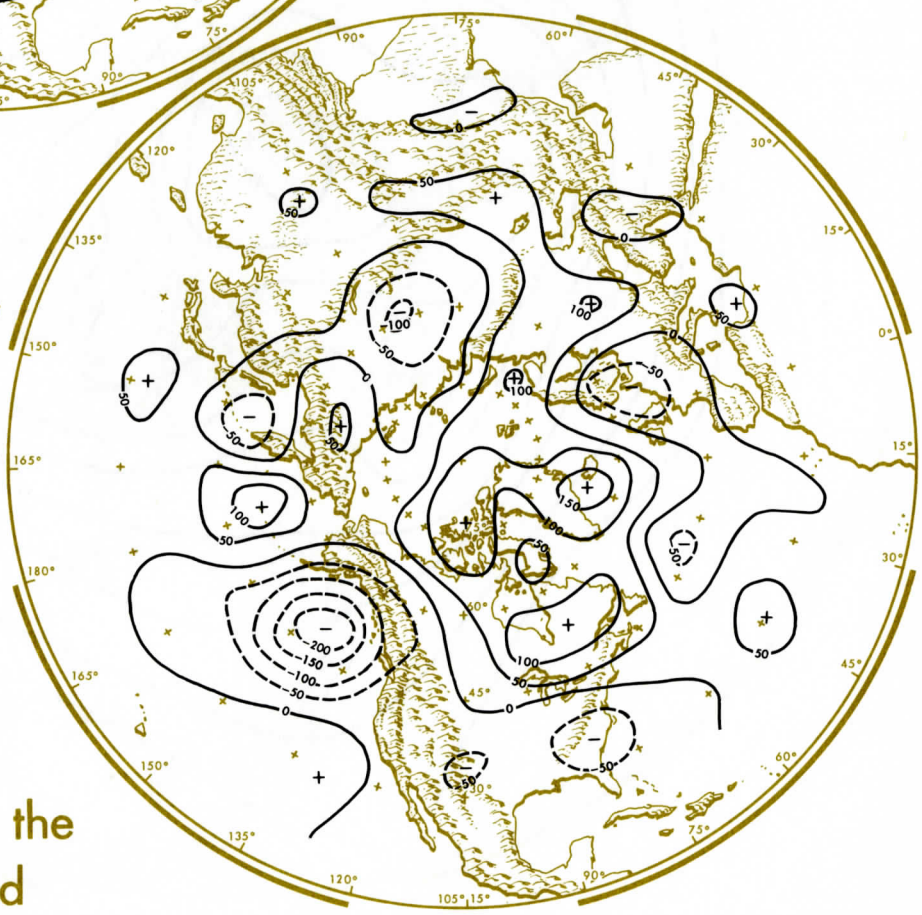
700 millibar
AVERAGE HEIGHT
April 21-25



700 millibar height
STANDARD DEVIATION



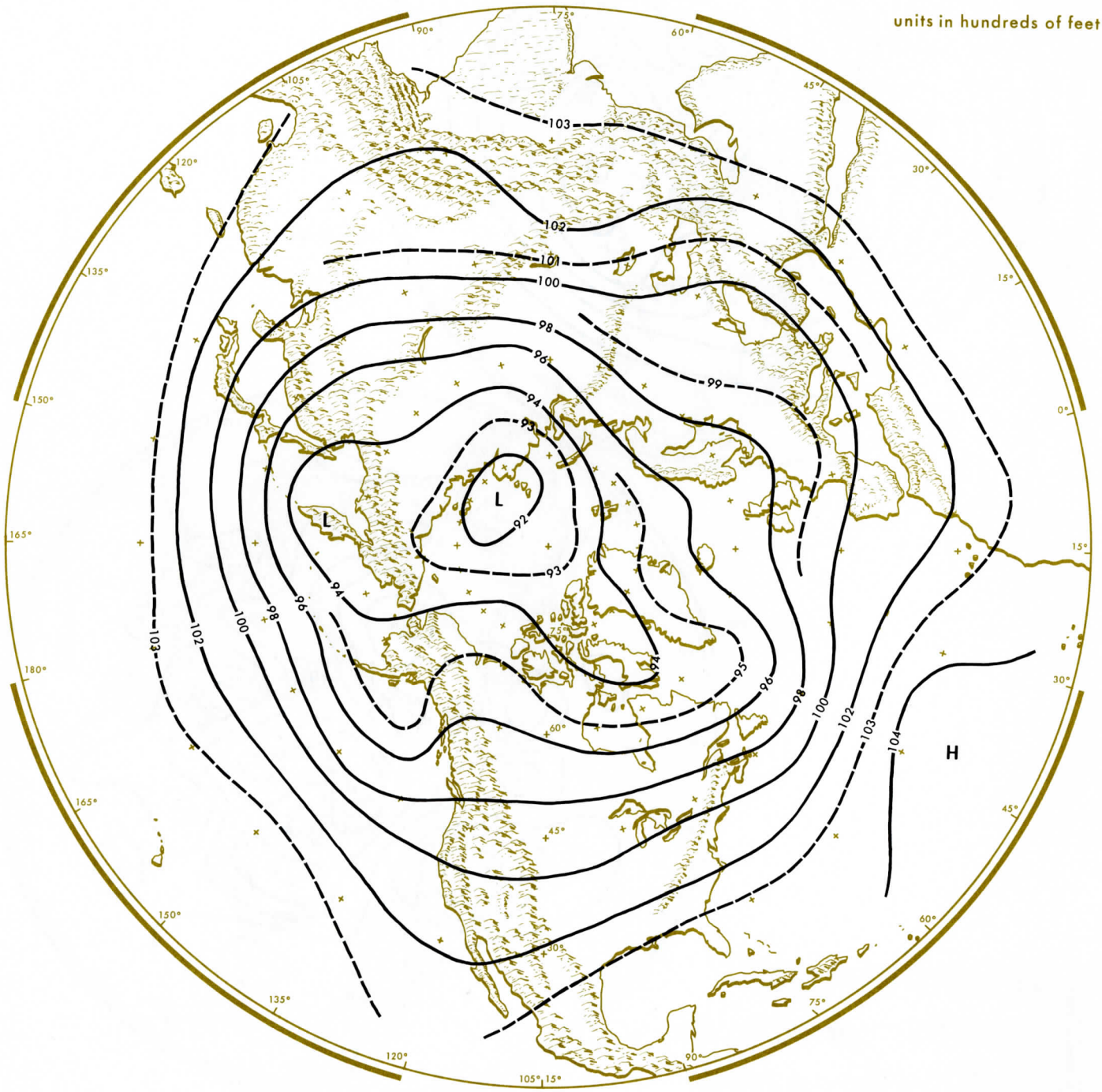
units in feet



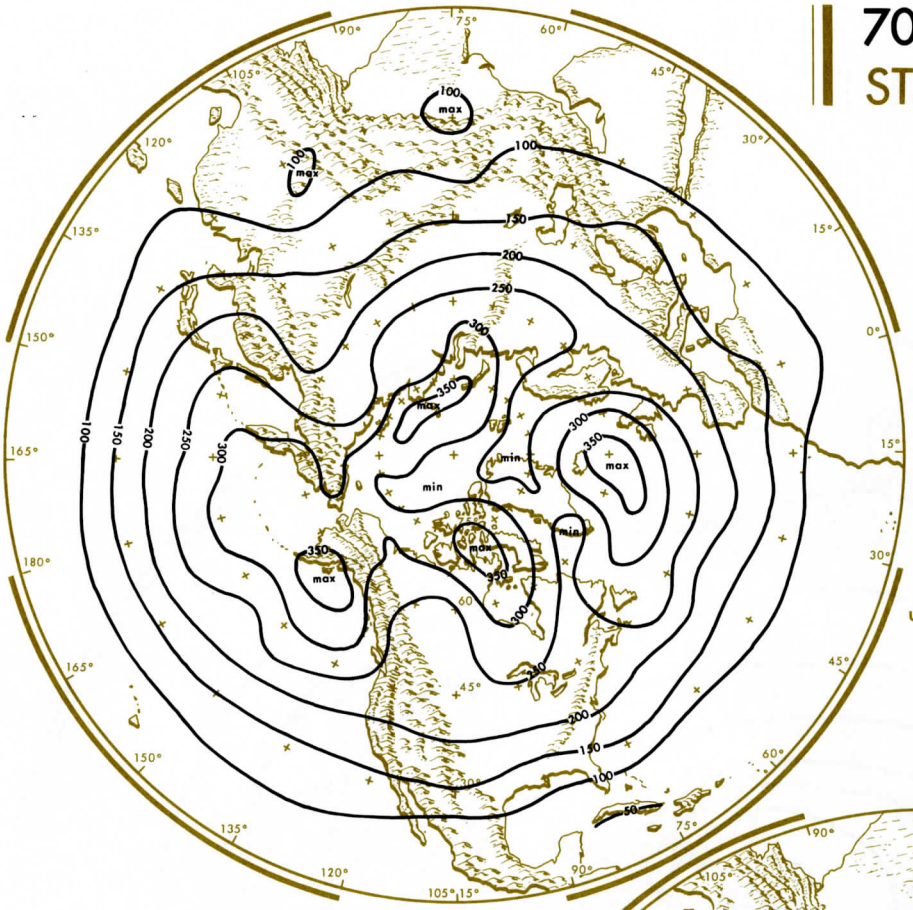
units in feet

HEIGHT CHANGE
from this period to the next five-day period

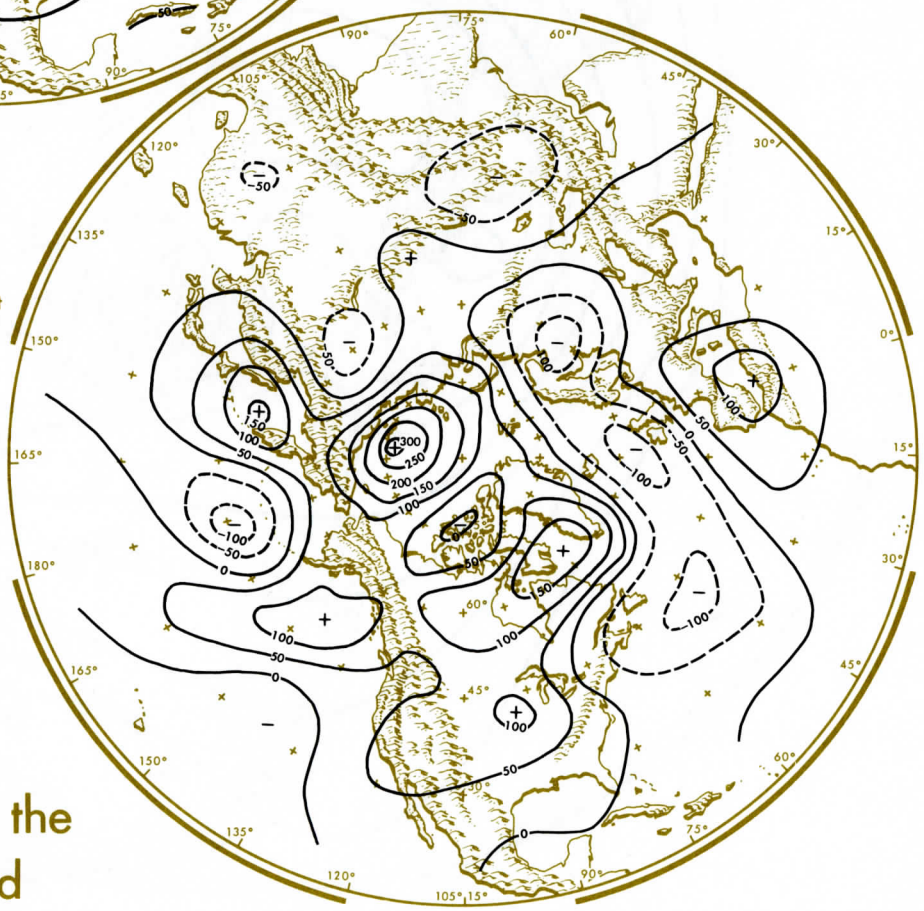
700 millibar
AVERAGE HEIGHT
April 26-30



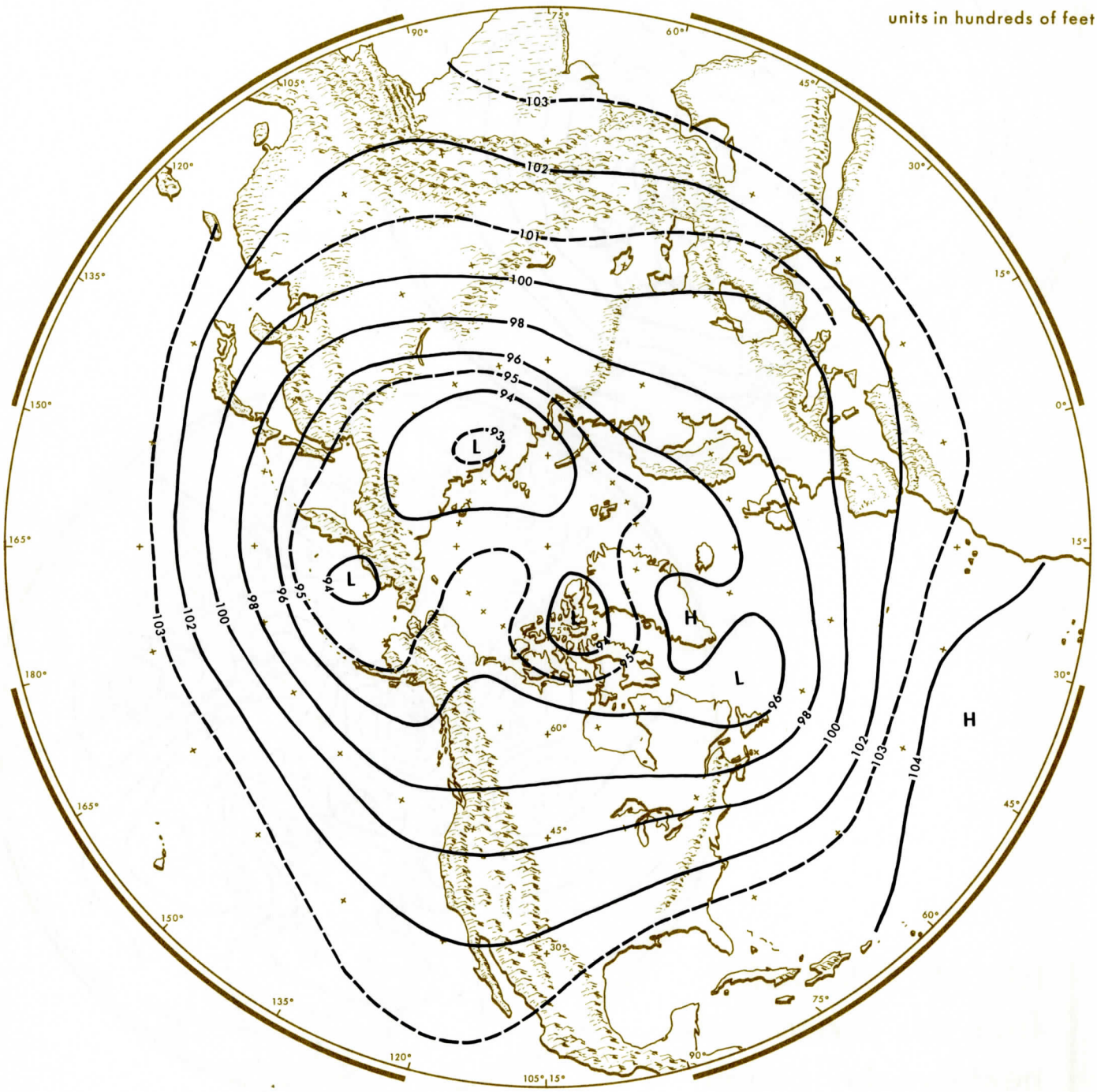
700 millibar height
STANDARD DEVIATION



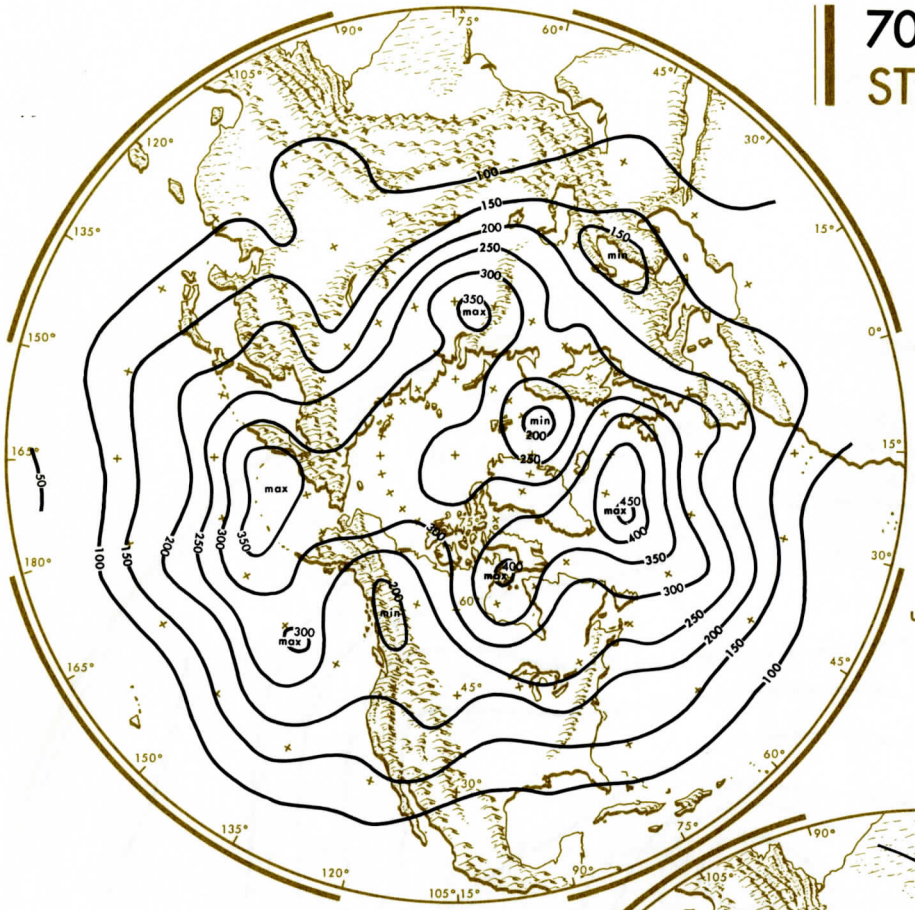
HEIGHT CHANGE
from this period to the next five-day period



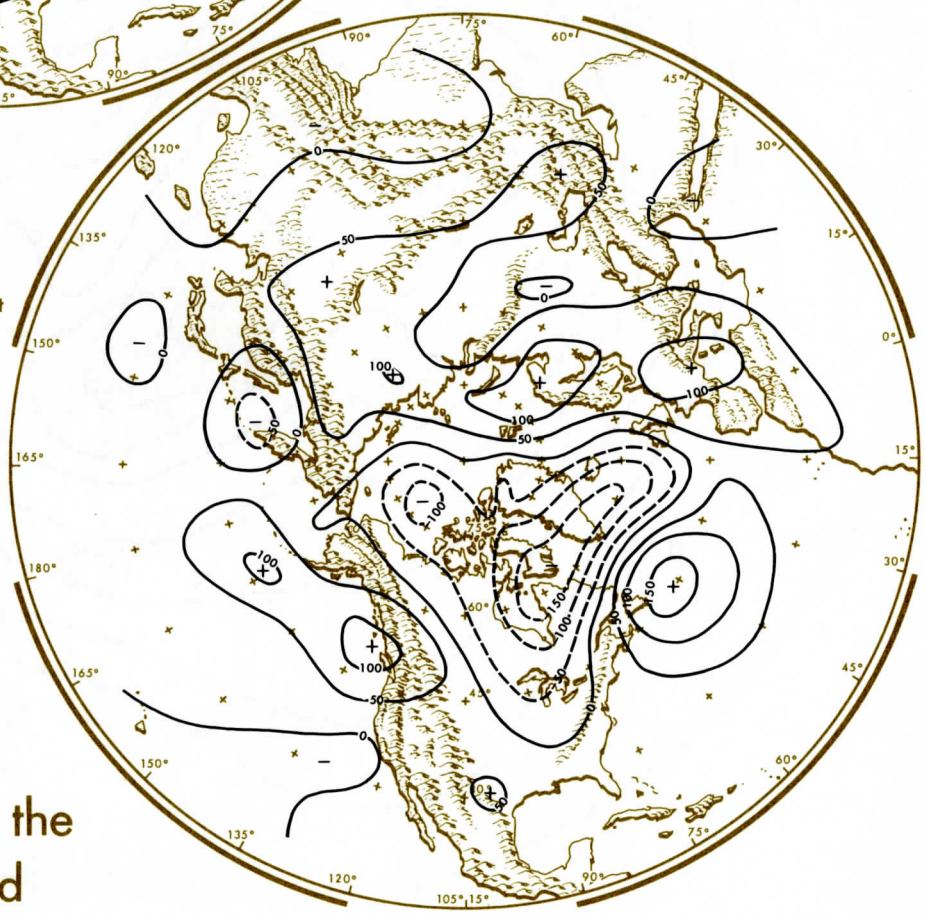
700 millibar
AVERAGE HEIGHT
May 1-5



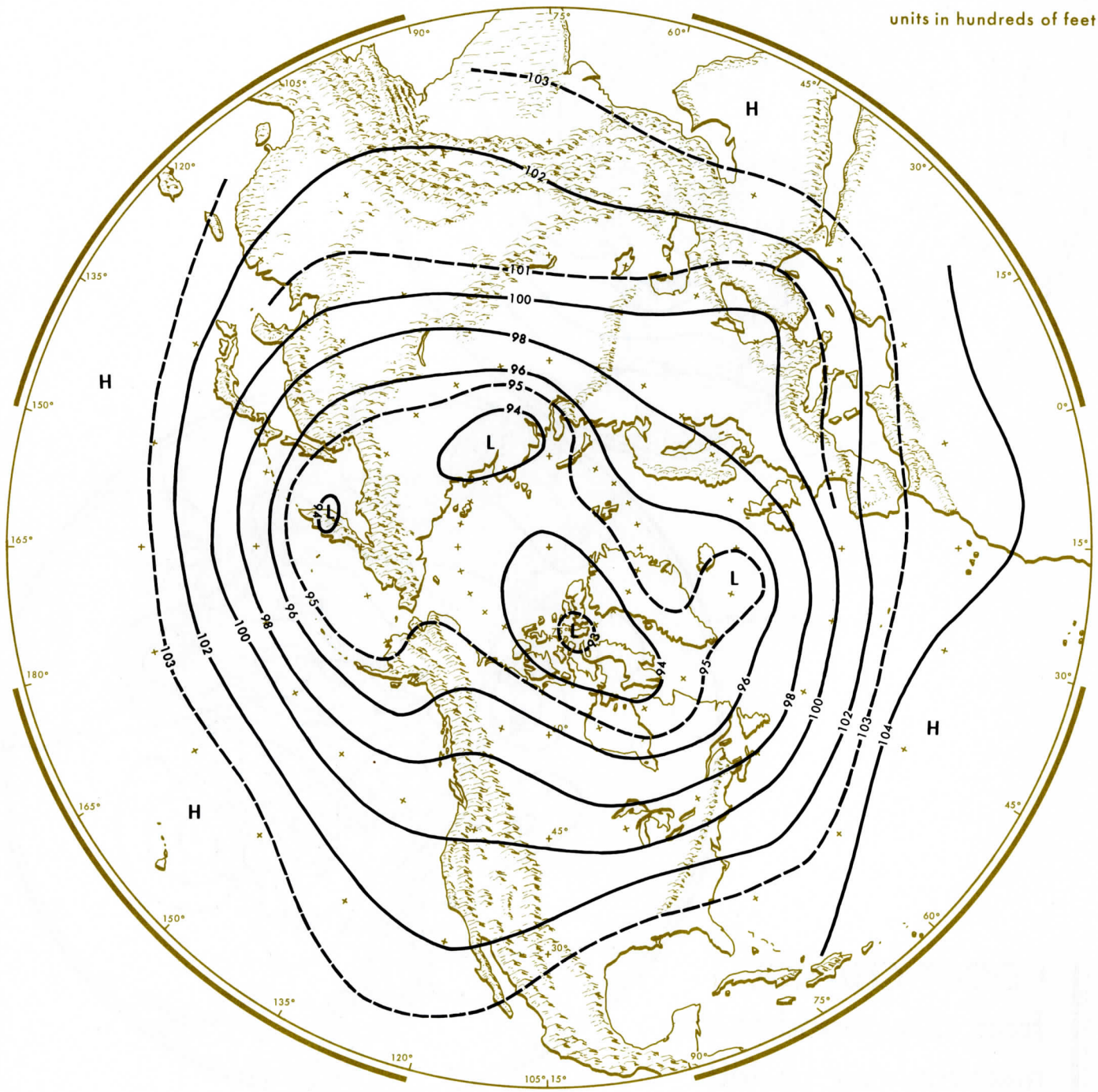
700 millibar height
STANDARD DEVIATION



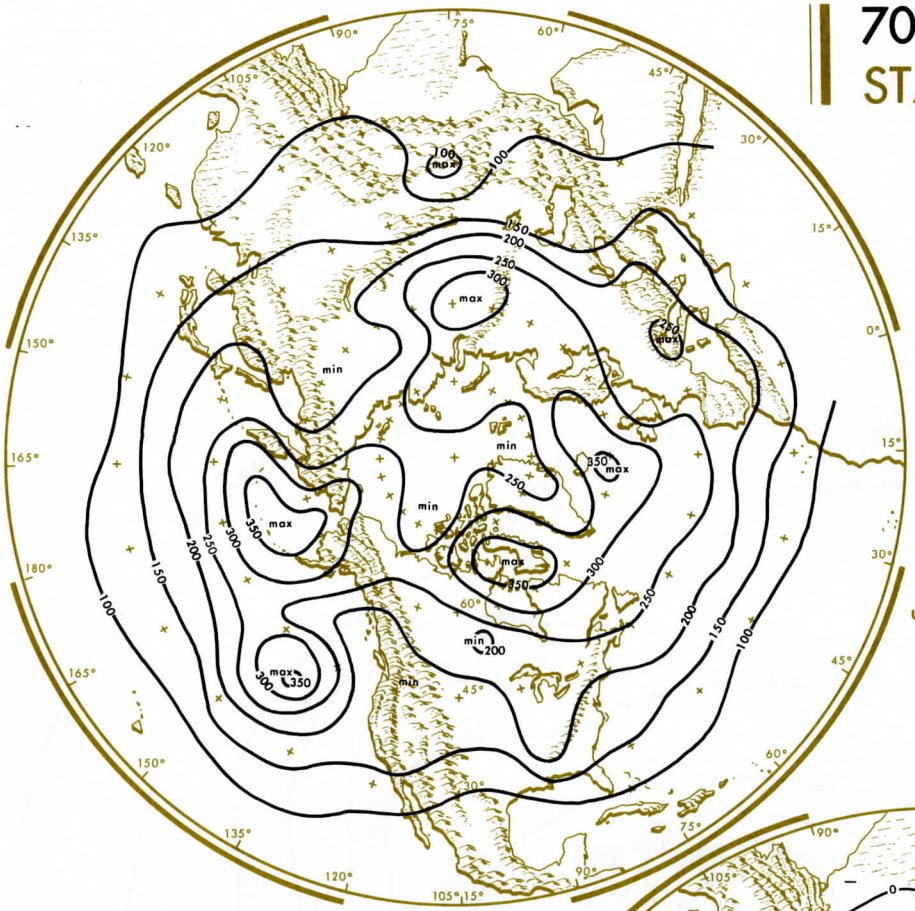
HEIGHT CHANGE
from this period to the next five-day period



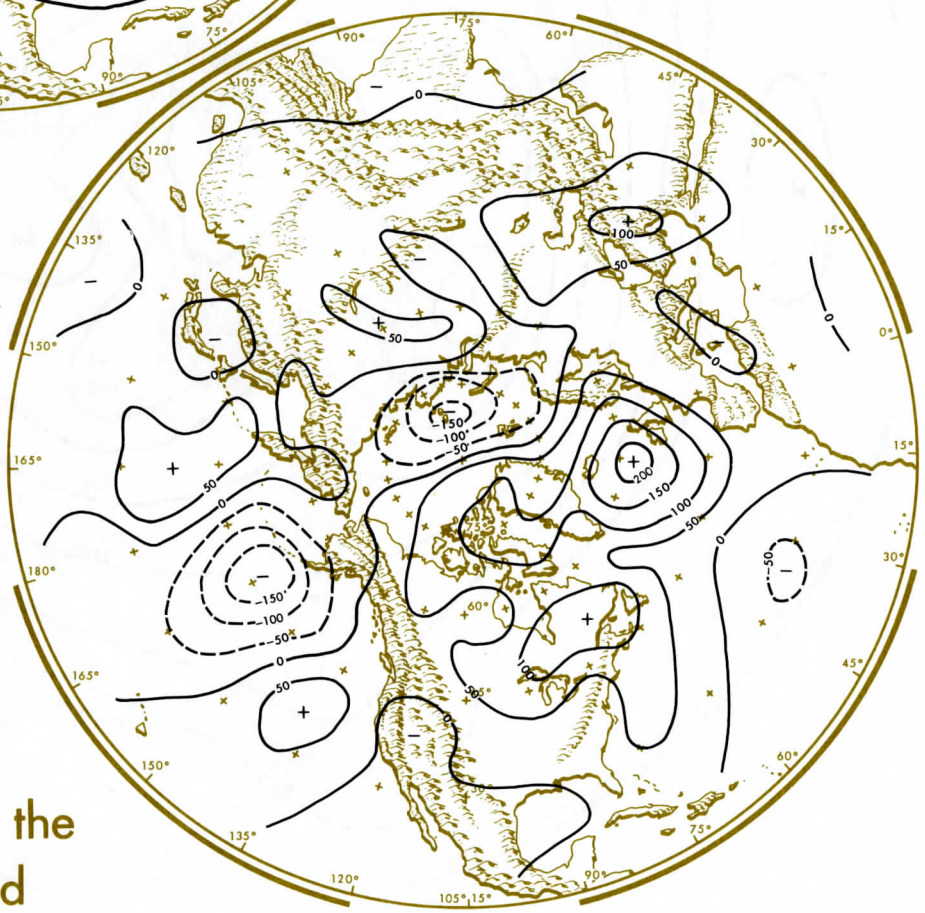
700 millibar
AVERAGE HEIGHT
May 6-10



700 millibar height
STANDARD DEVIATION



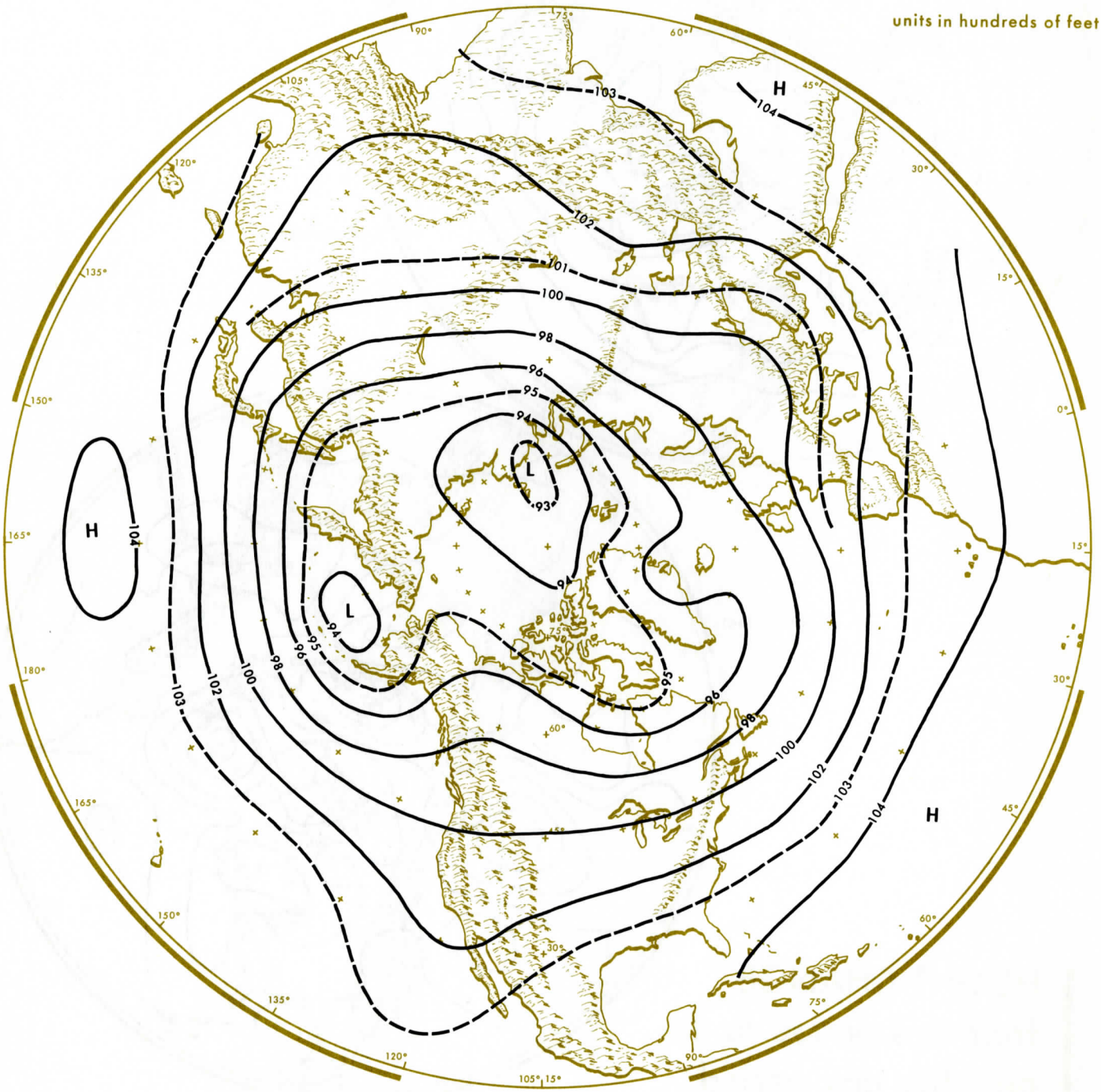
units in feet



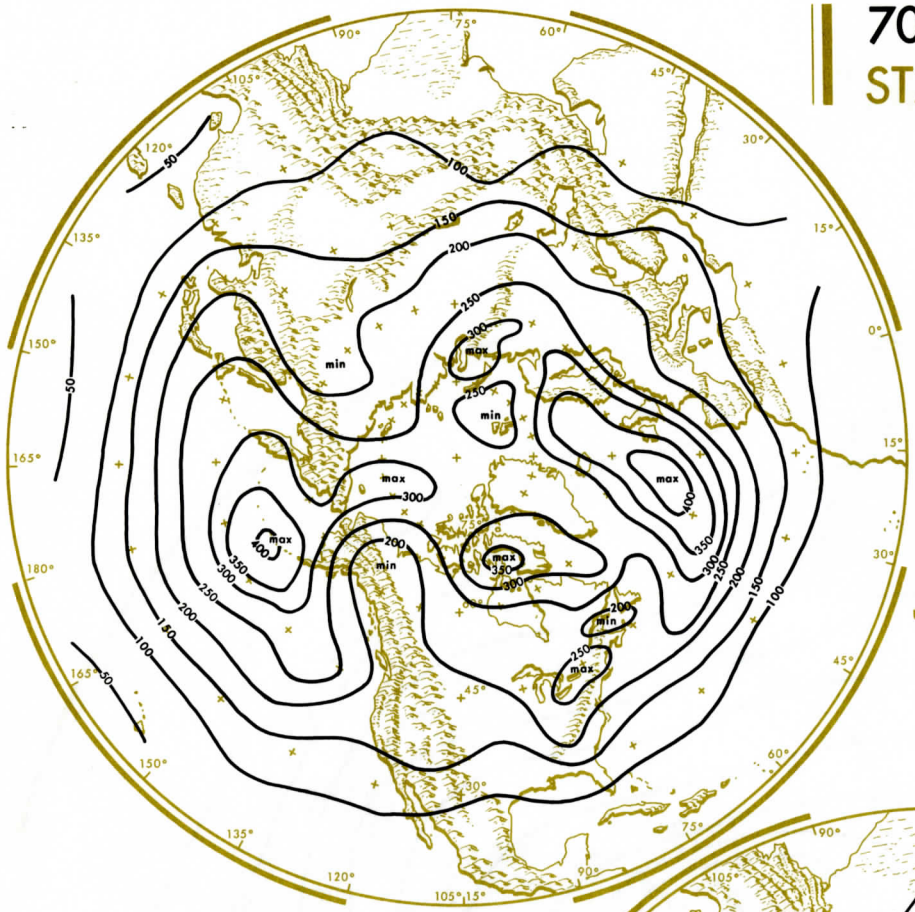
units in feet

HEIGHT CHANGE
from this period to the next five-day period

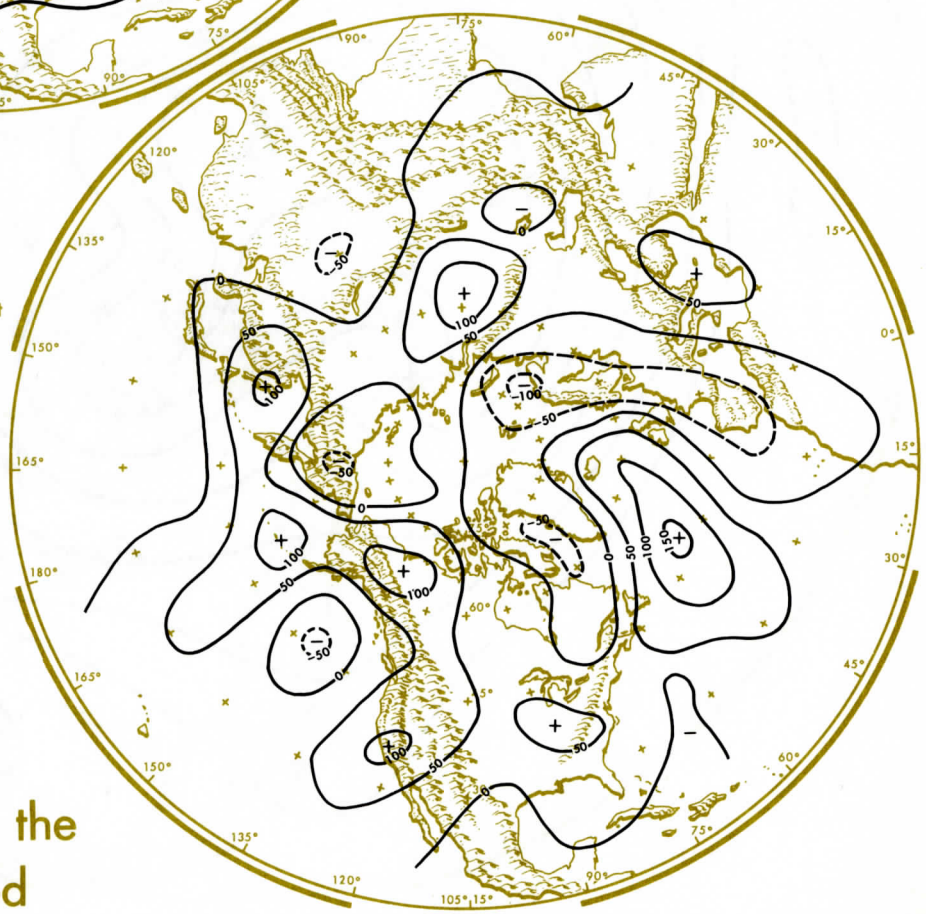
700 millibar
AVERAGE HEIGHT
May 11-15



700 millibar height
STANDARD DEVIATION



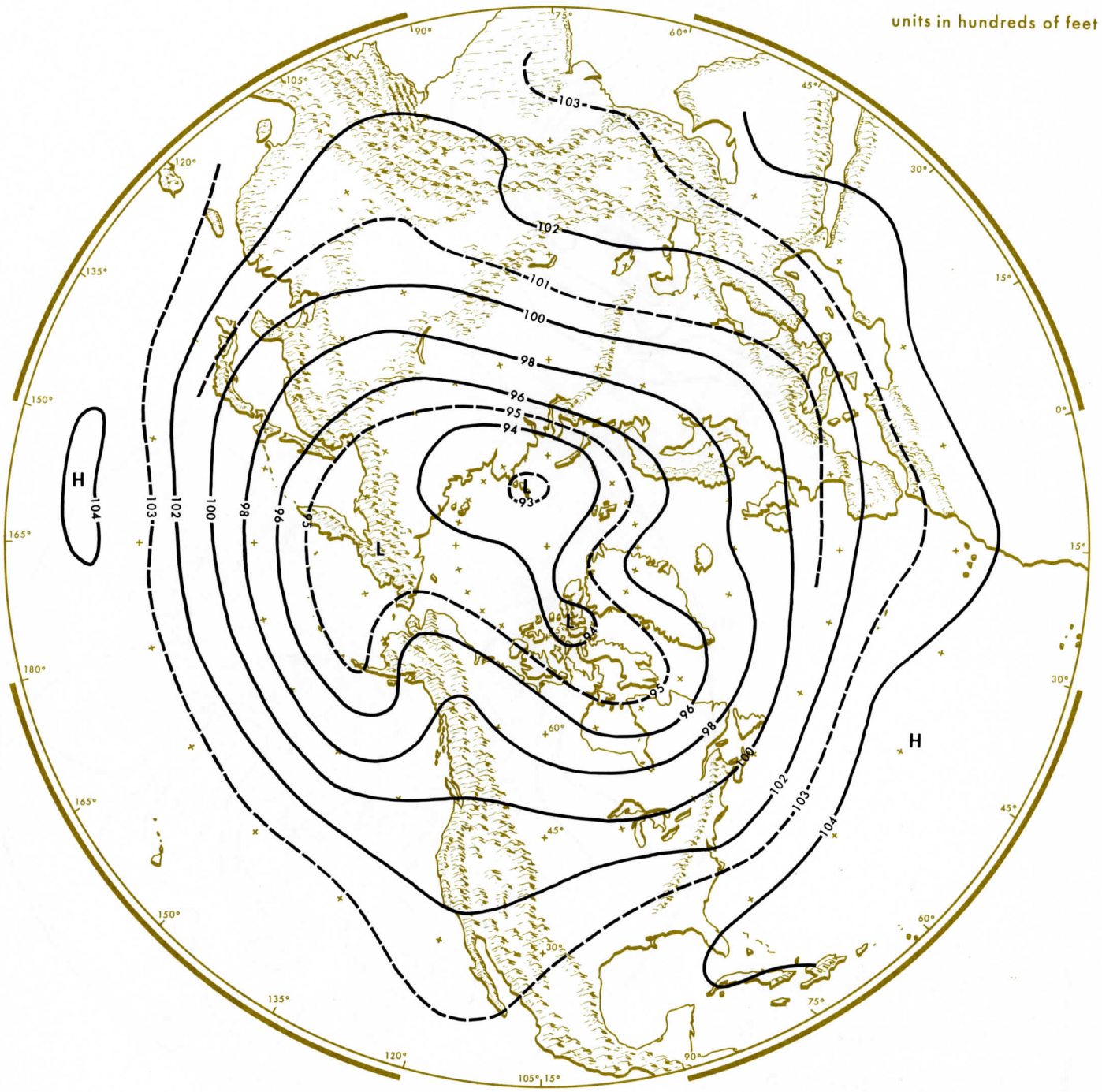
units in feet



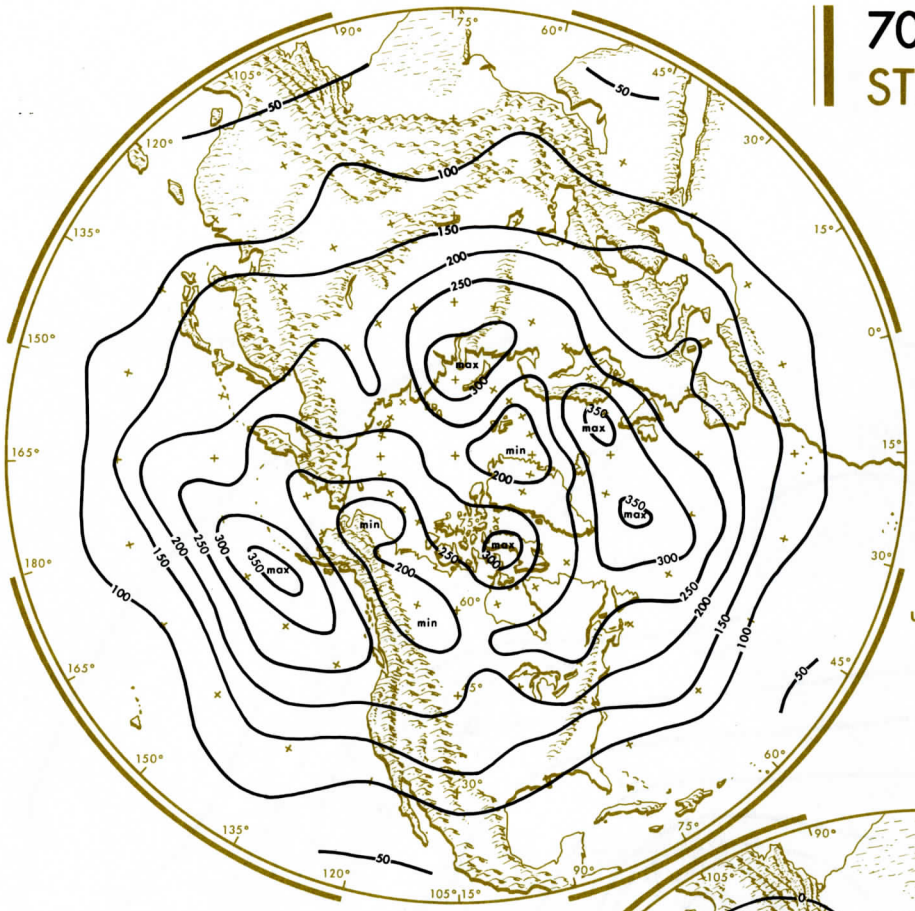
units in feet

HEIGHT CHANGE
from this period to the next five-day period

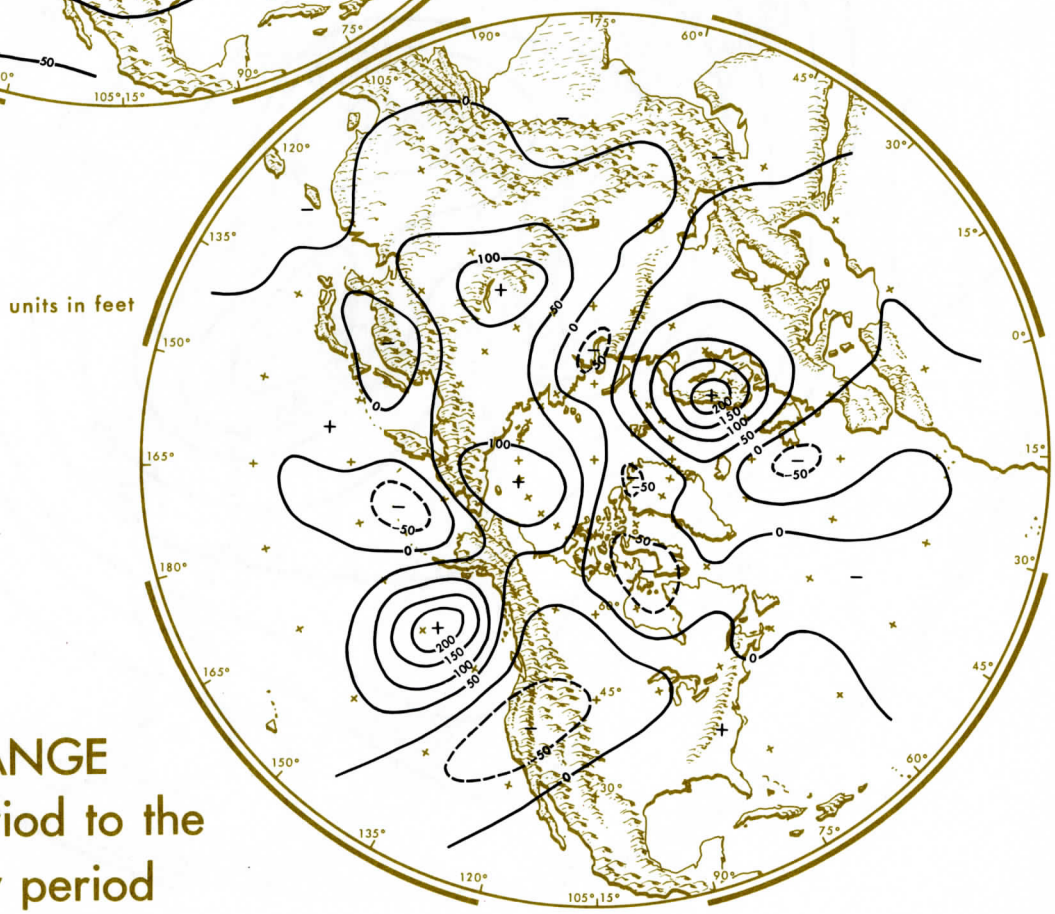
700 millibar
AVERAGE HEIGHT
May 16-20



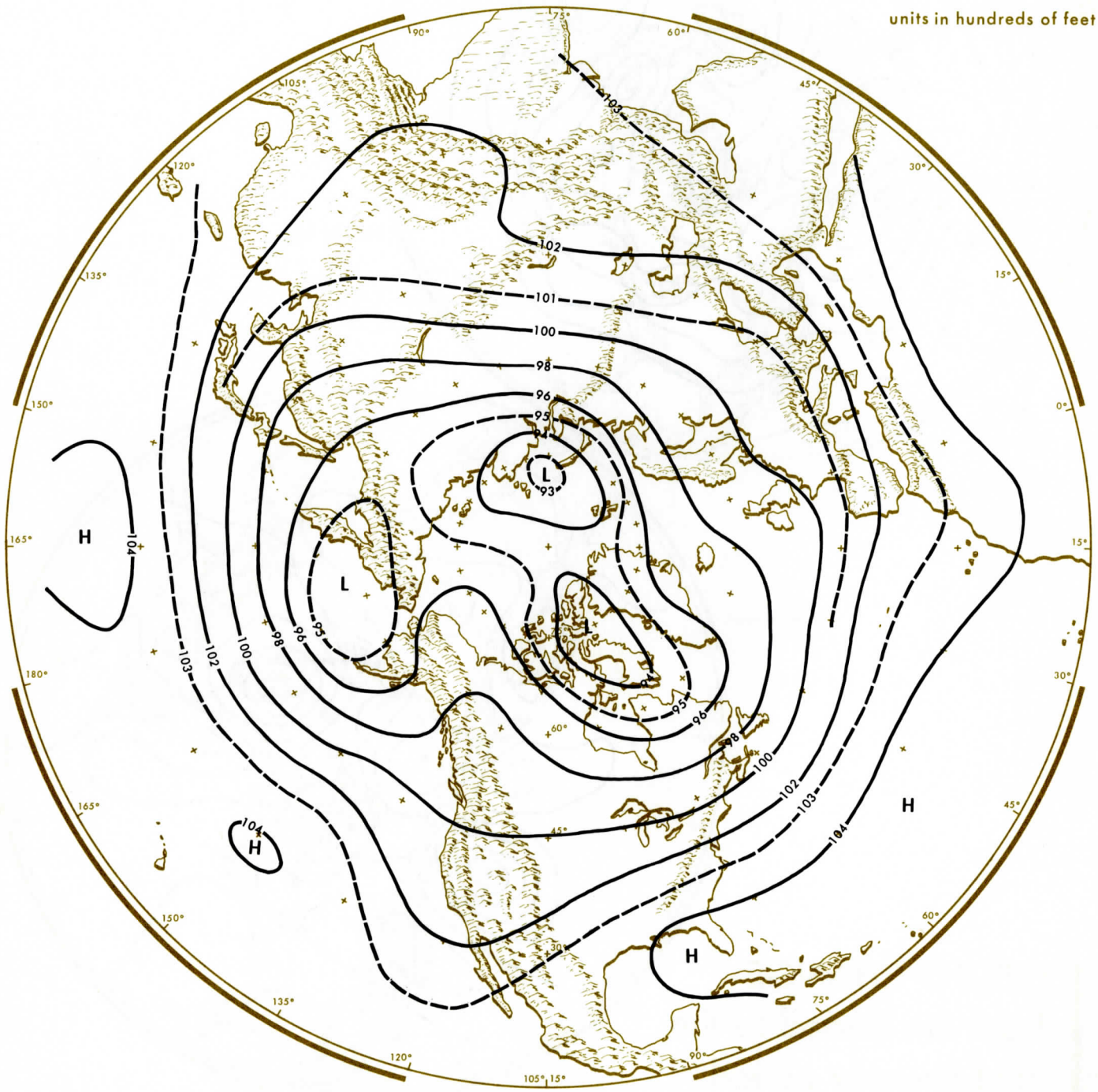
700 millibar height
STANDARD DEVIATION



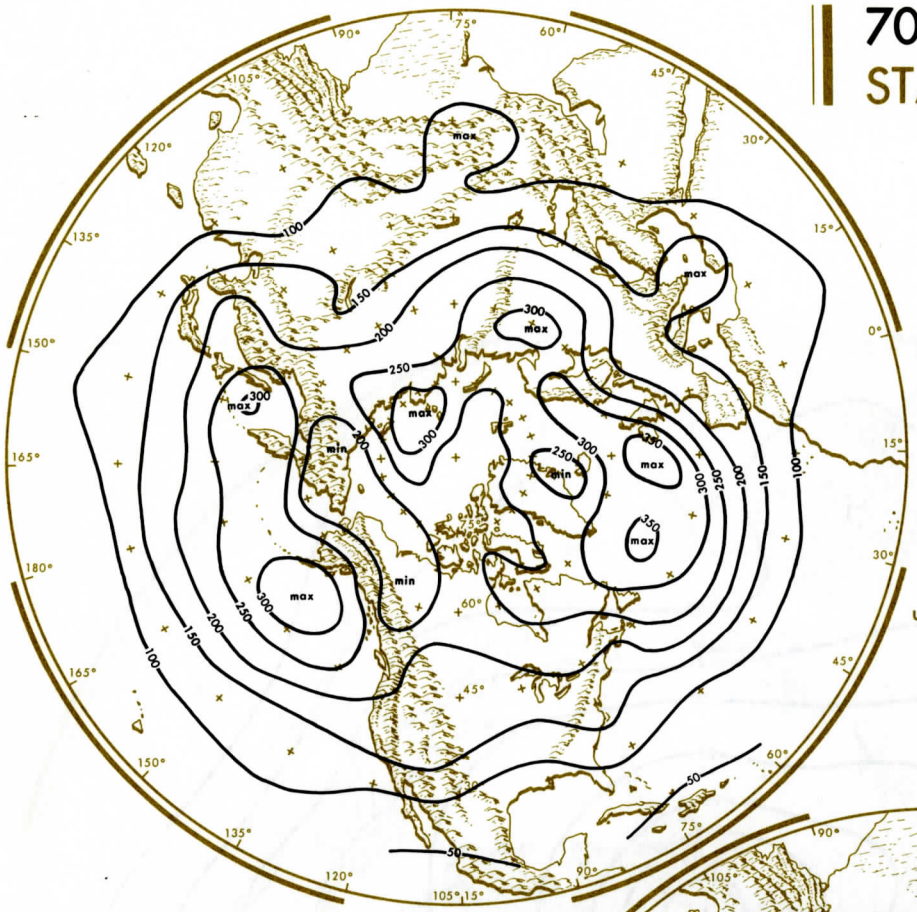
HEIGHT CHANGE
from this period to the next five-day period



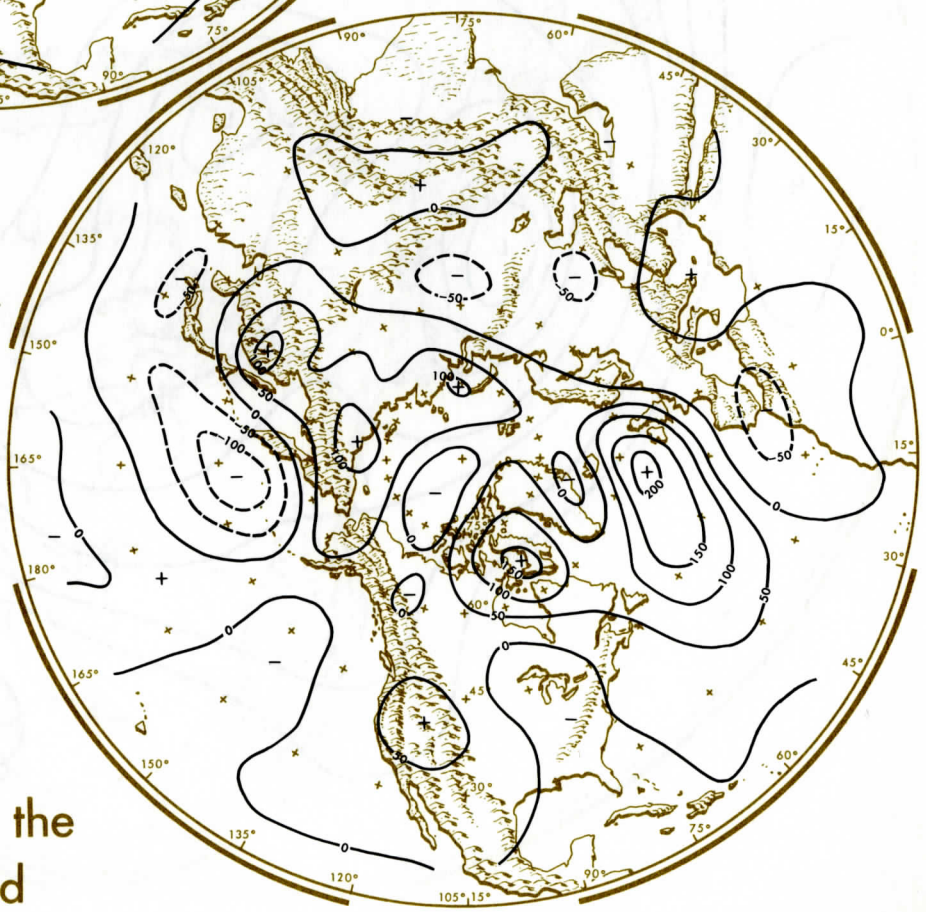
700 millibar
AVERAGE HEIGHT
May 21-25



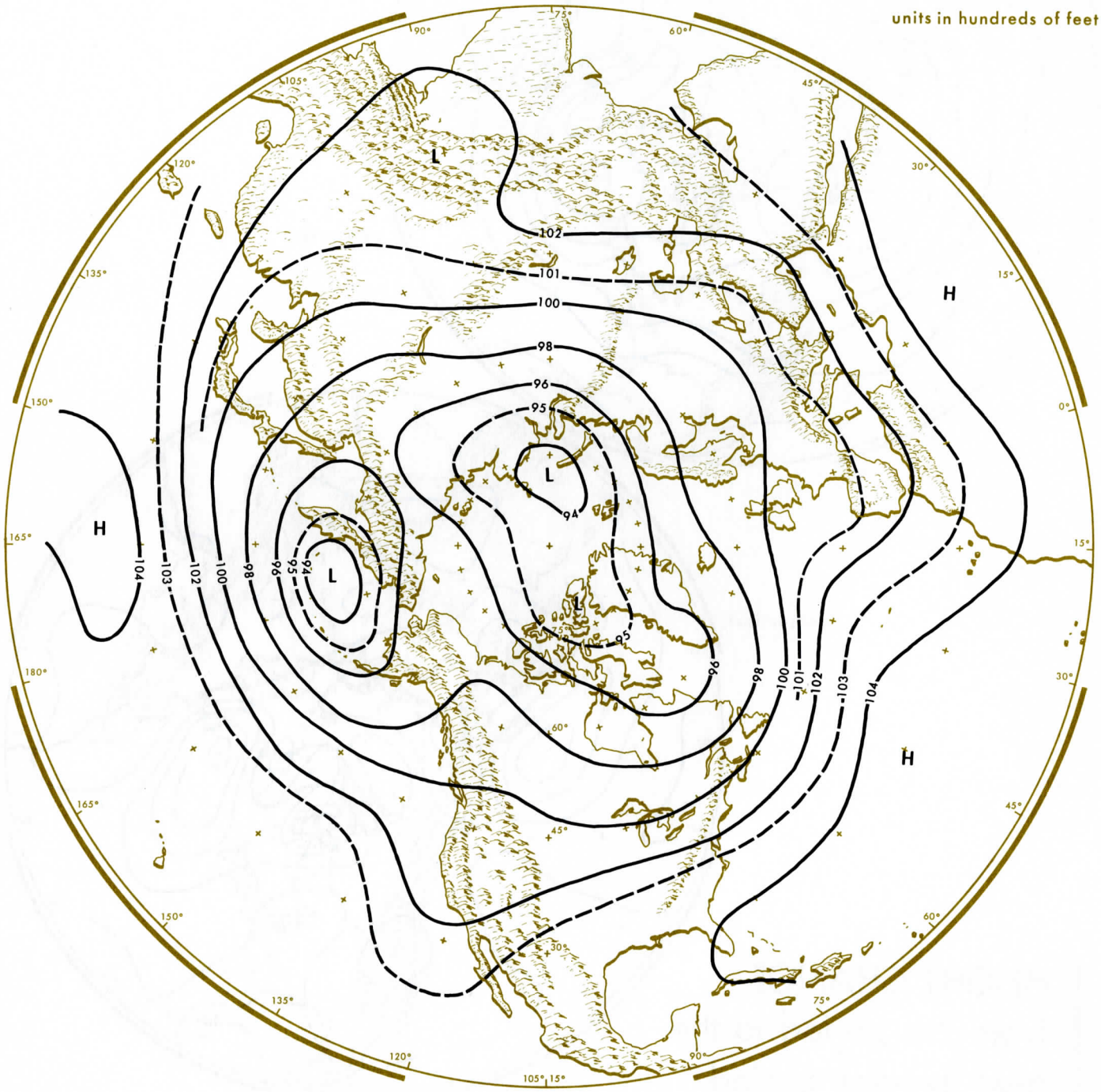
700 millibar height
STANDARD DEVIATION



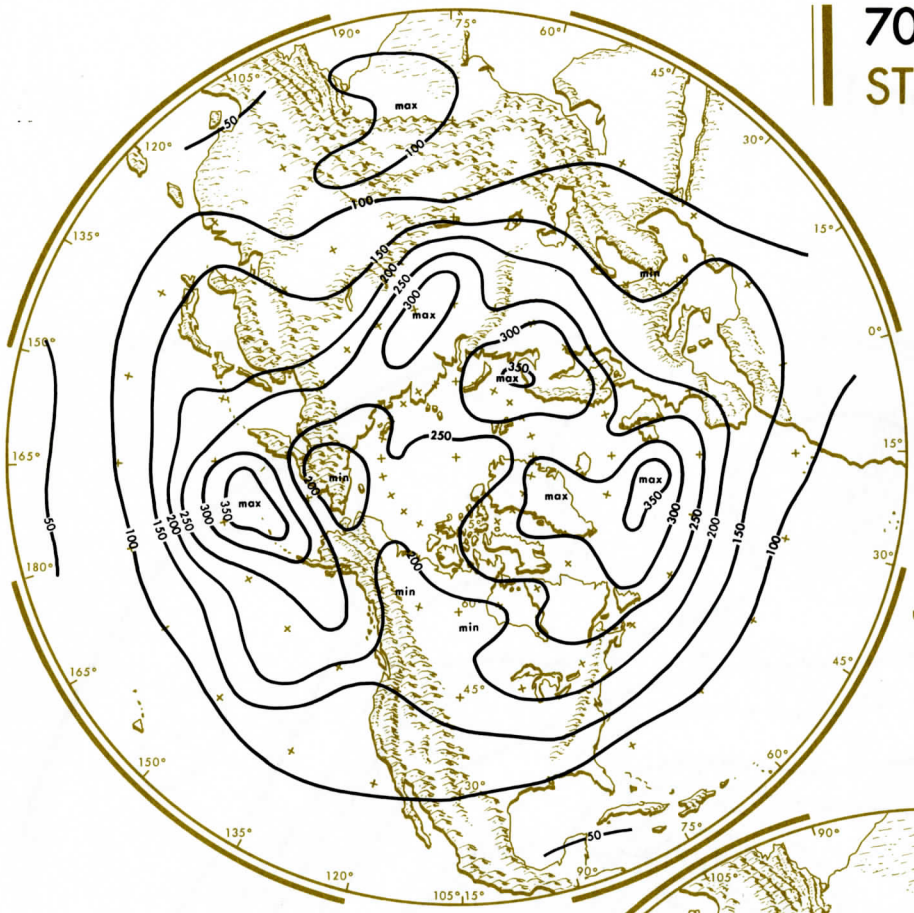
HEIGHT CHANGE
from this period to the next five-day period



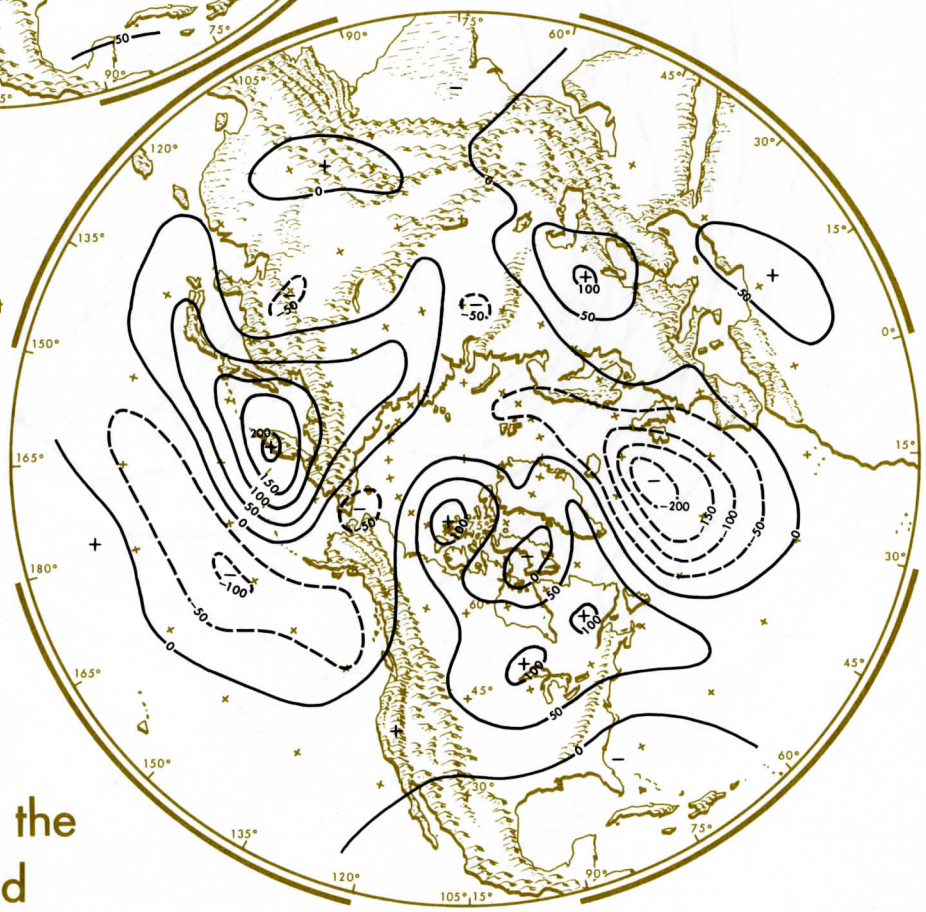
700 millibar
AVERAGE HEIGHT
May 26-30



700 millibar height
STANDARD DEVIATION



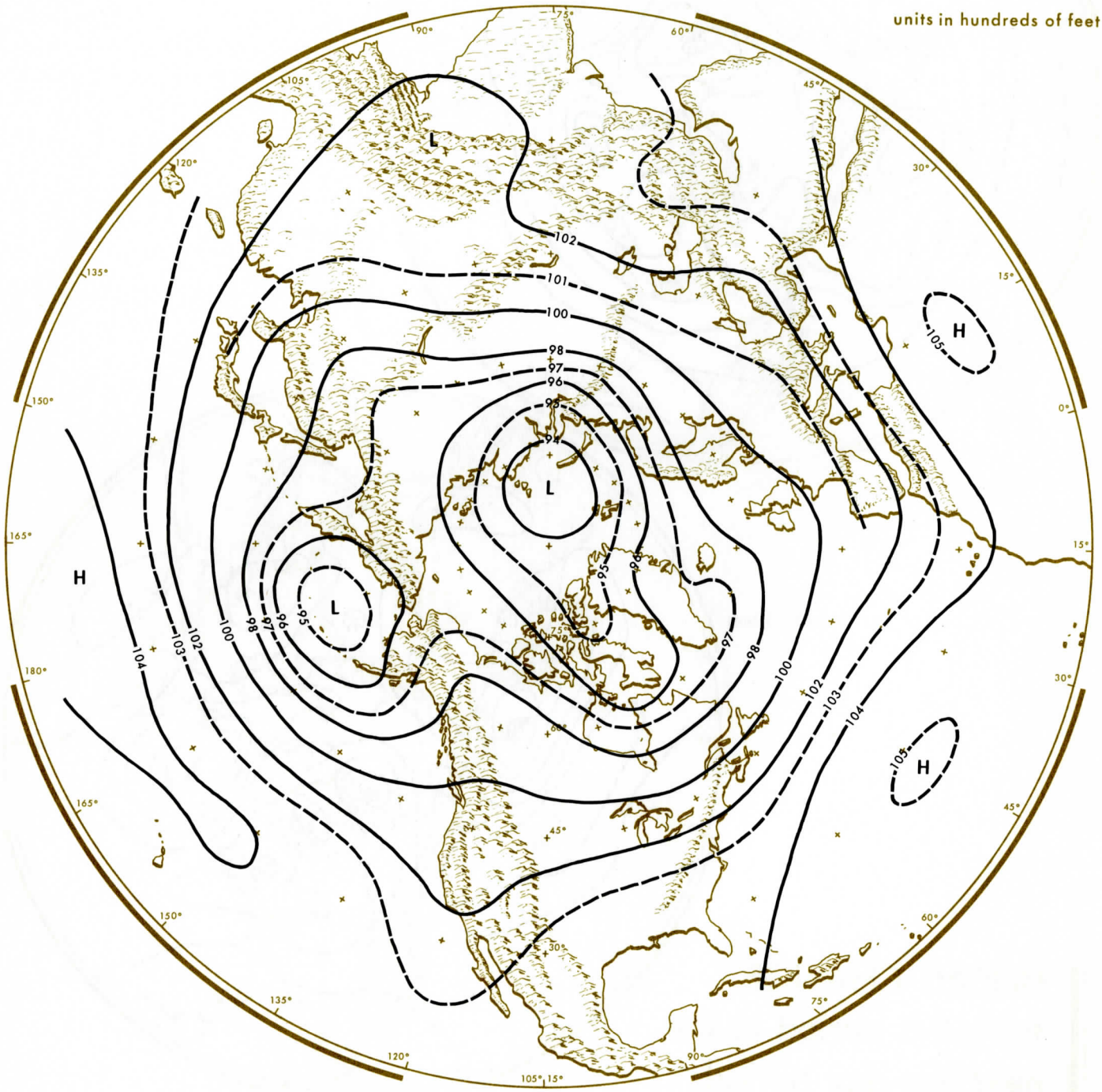
units in feet



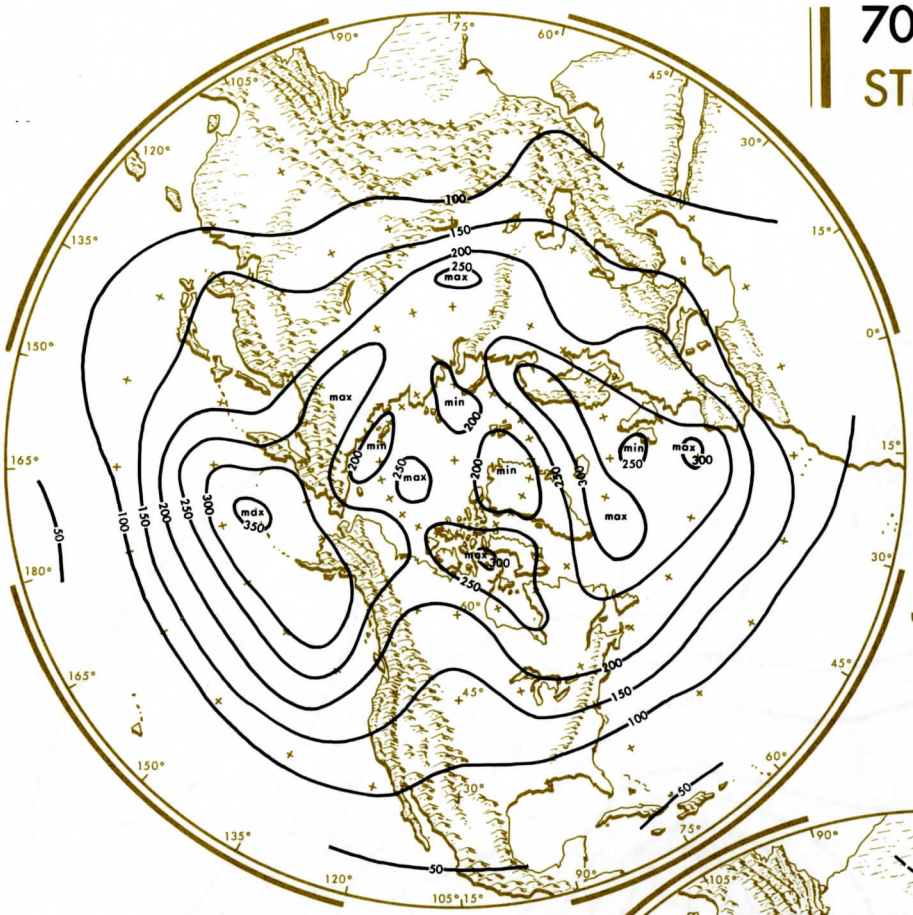
units in feet

HEIGHT CHANGE
from this period to the next five-day period

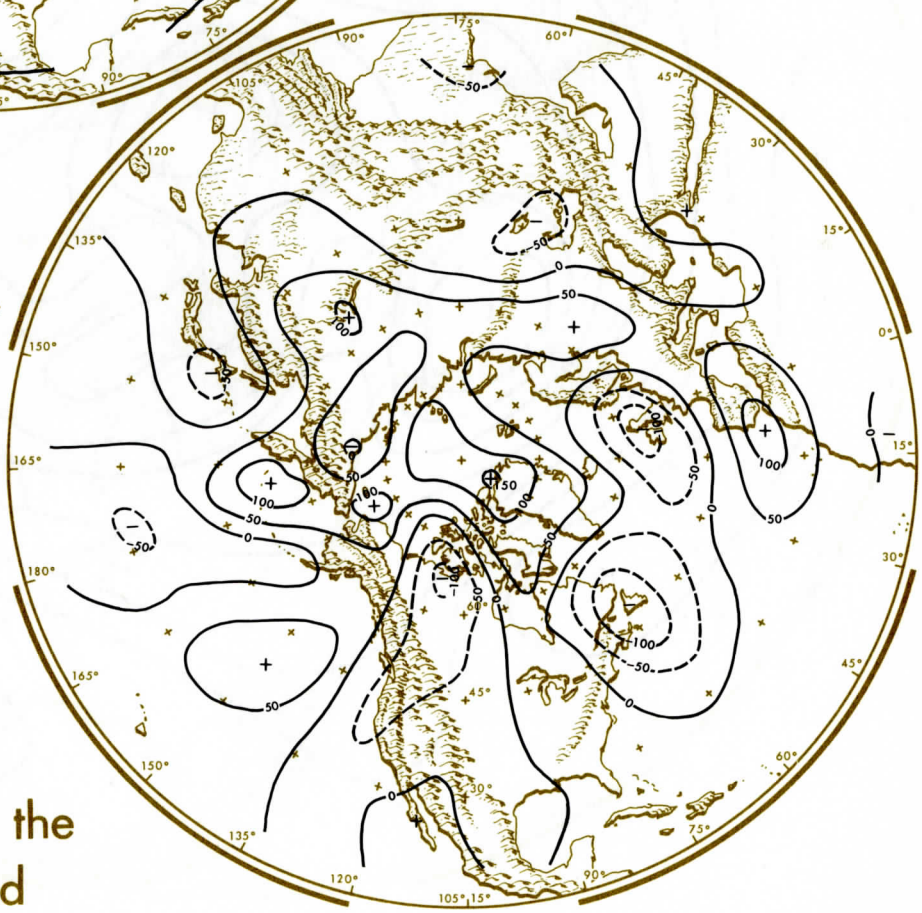
700 millibar
AVERAGE HEIGHT
May 31-June 4



700 millibar height
STANDARD DEVIATION



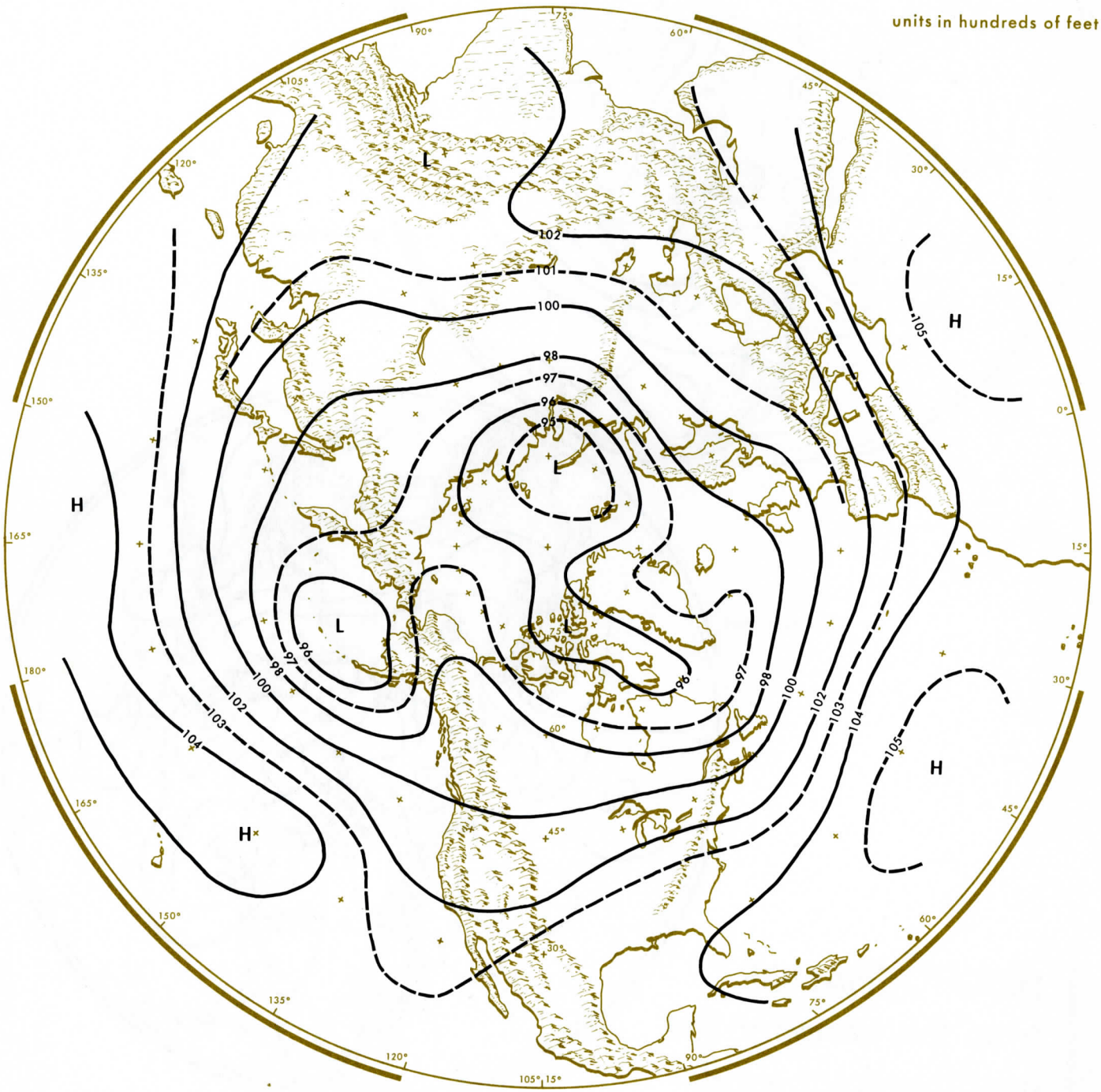
units in feet



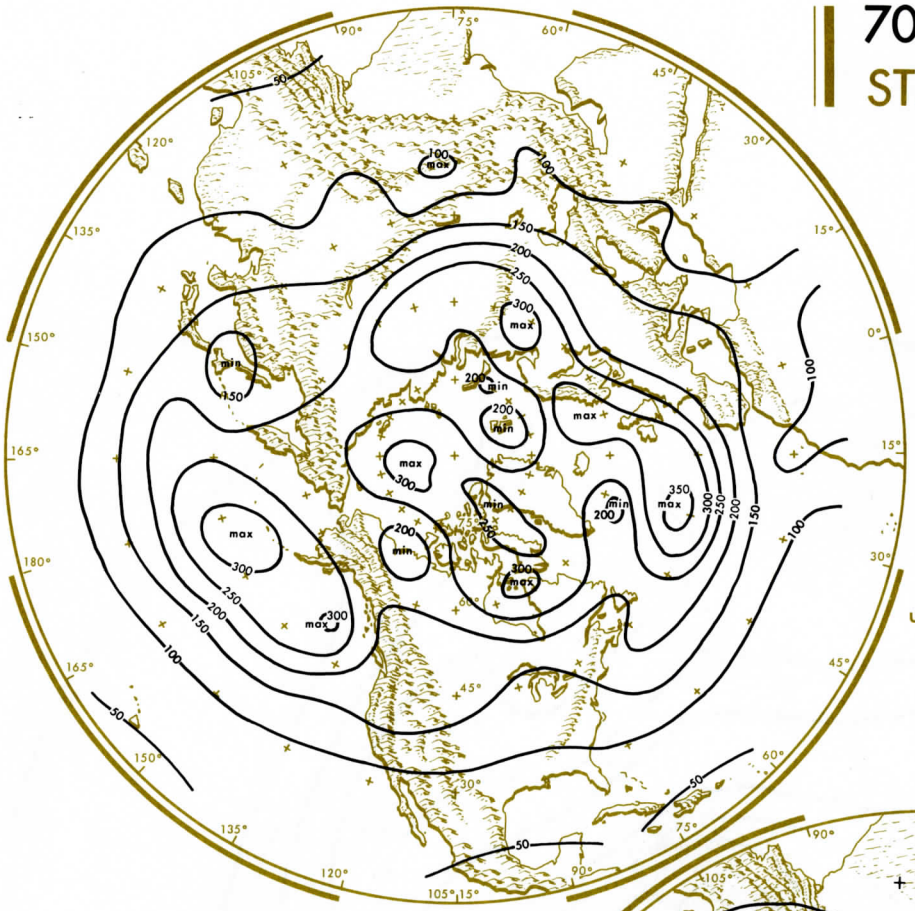
units in feet

HEIGHT CHANGE
from this period to the next five-day period

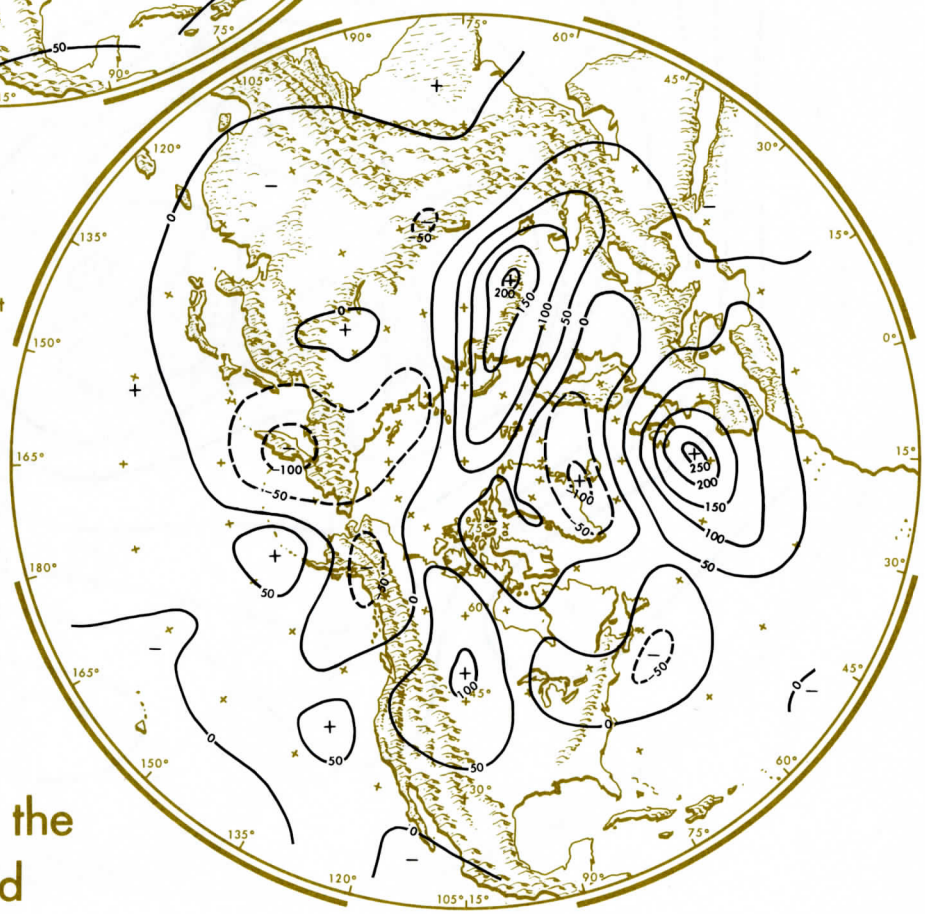
700 millibar
AVERAGE HEIGHT
June 5-9



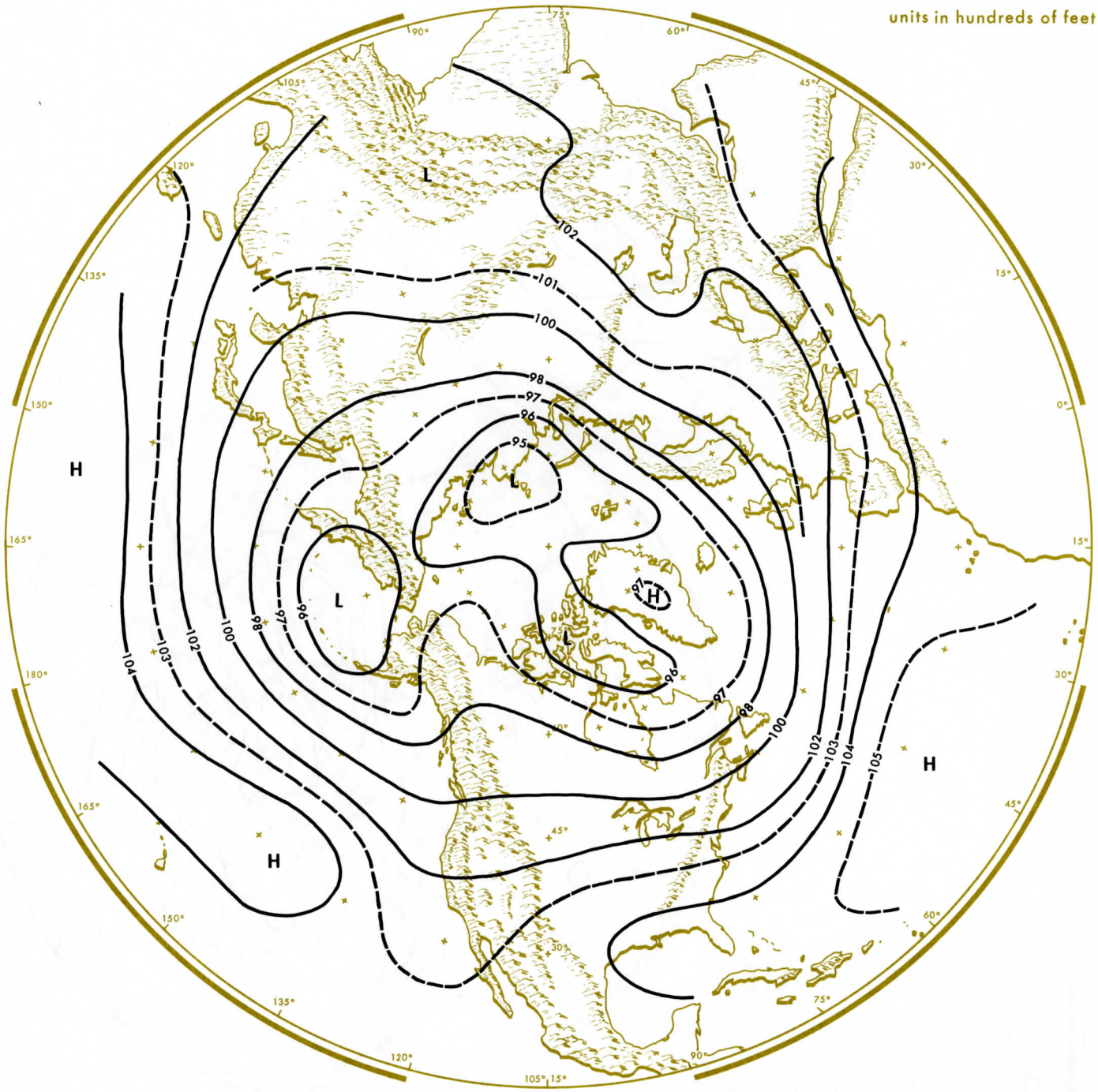
700 millibar height
STANDARD DEVIATION



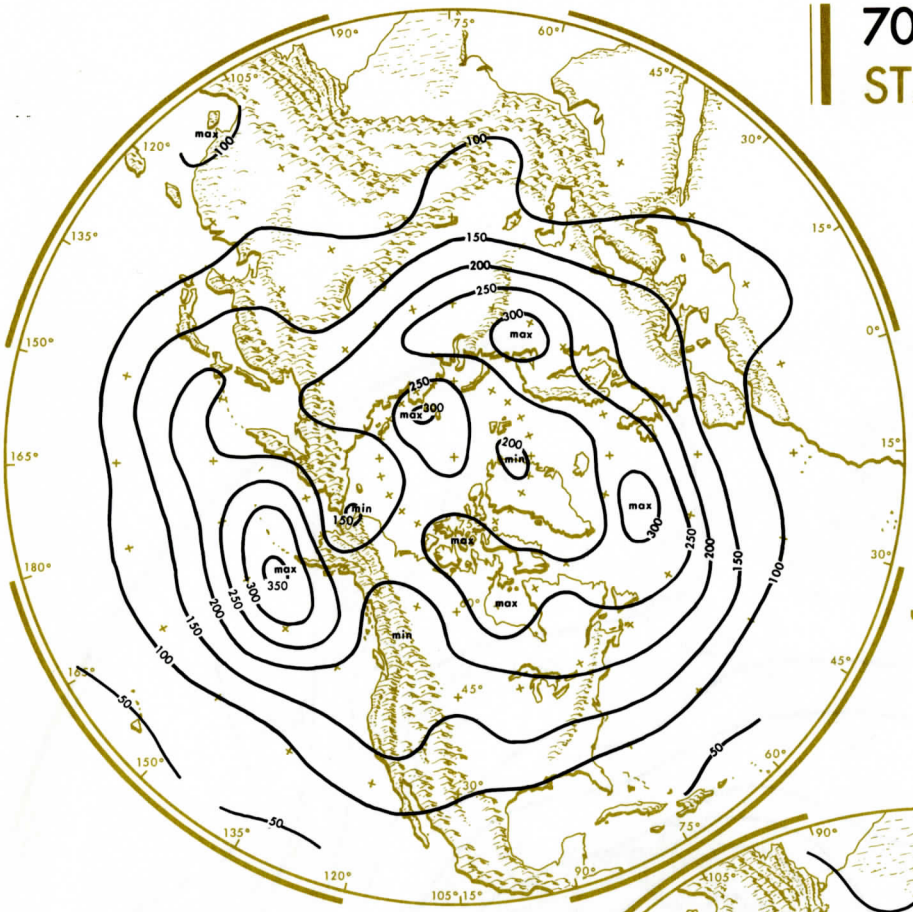
HEIGHT CHANGE
from this period to the next five-day period



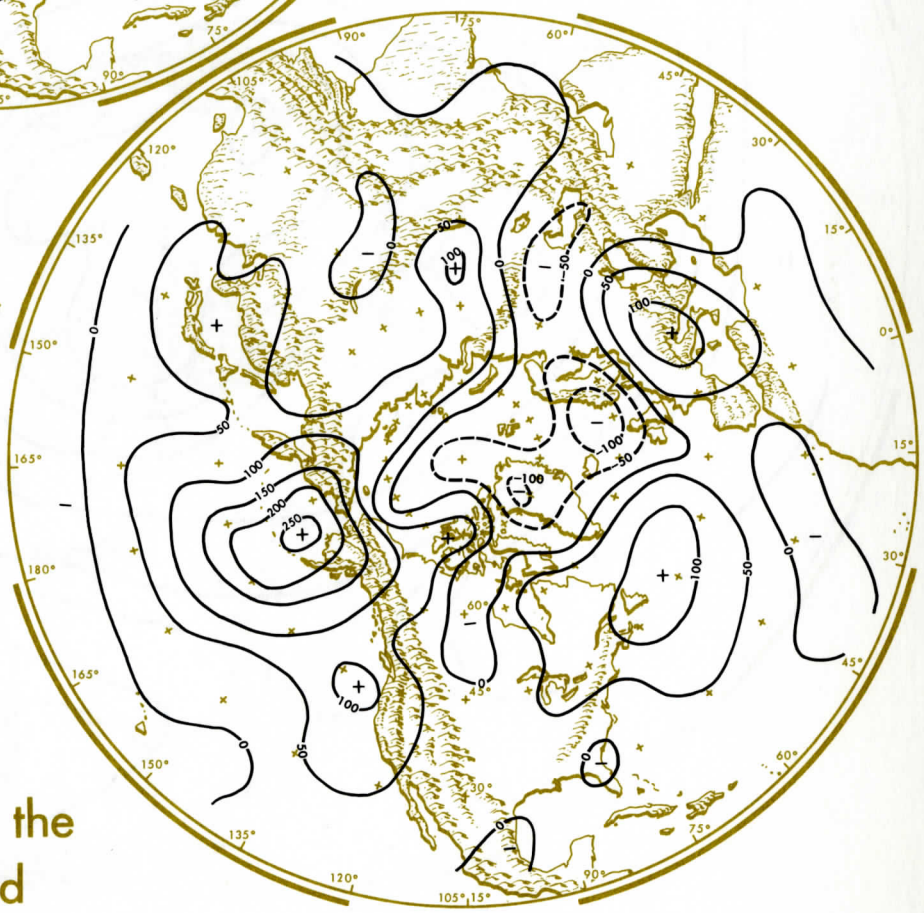
700 millibar
AVERAGE HEIGHT
June 10-14



700 millibar height
STANDARD DEVIATION



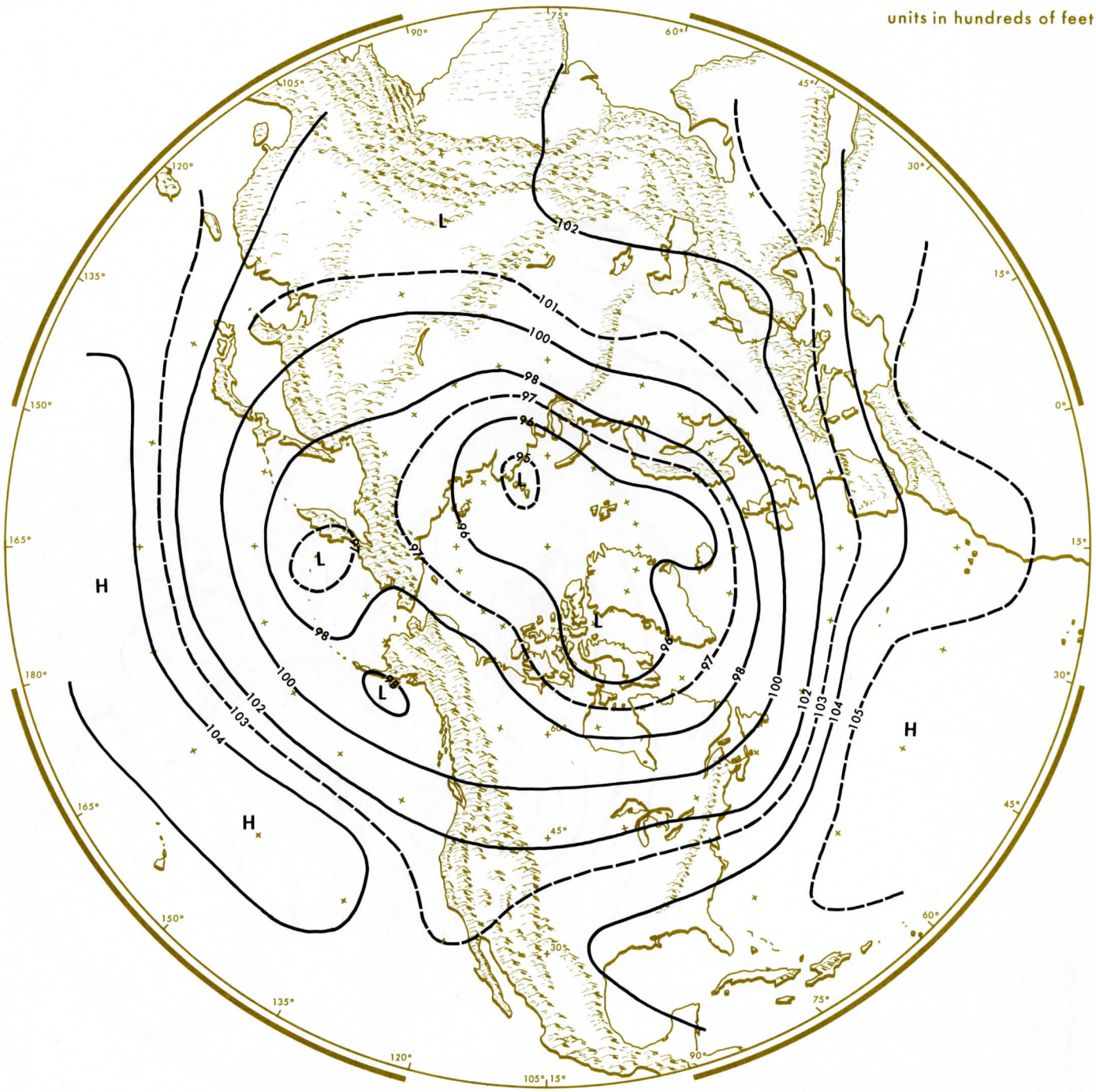
units in feet



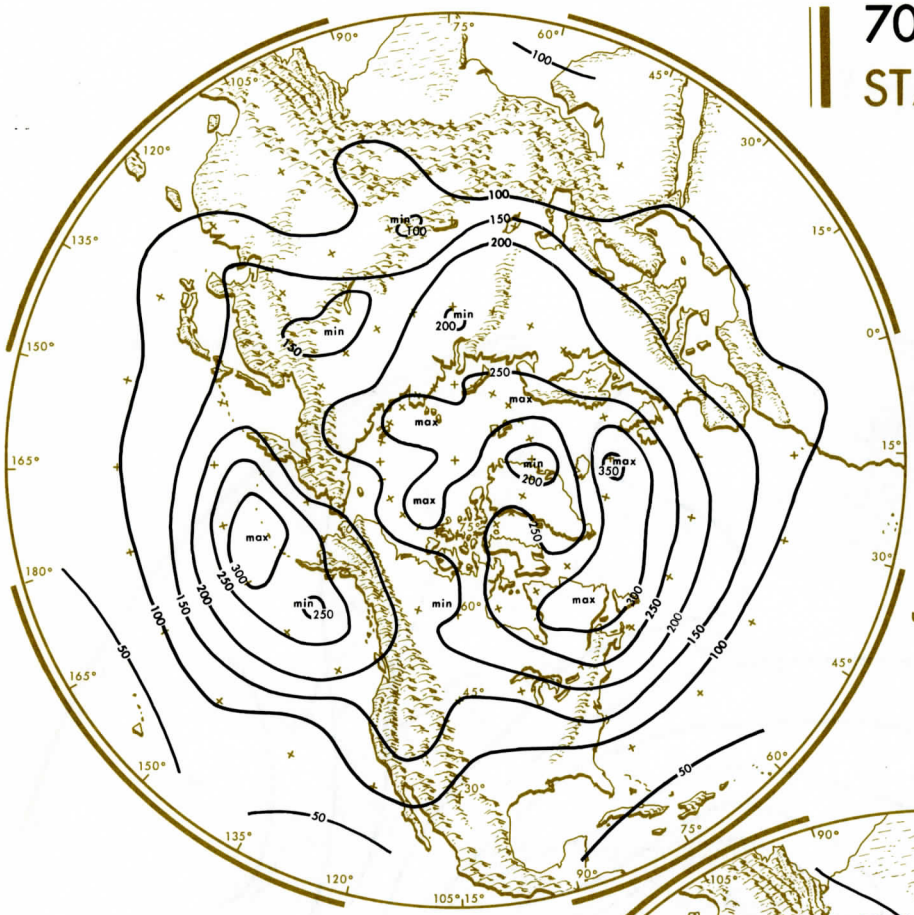
units in feet

HEIGHT CHANGE
from this period to the next five-day period

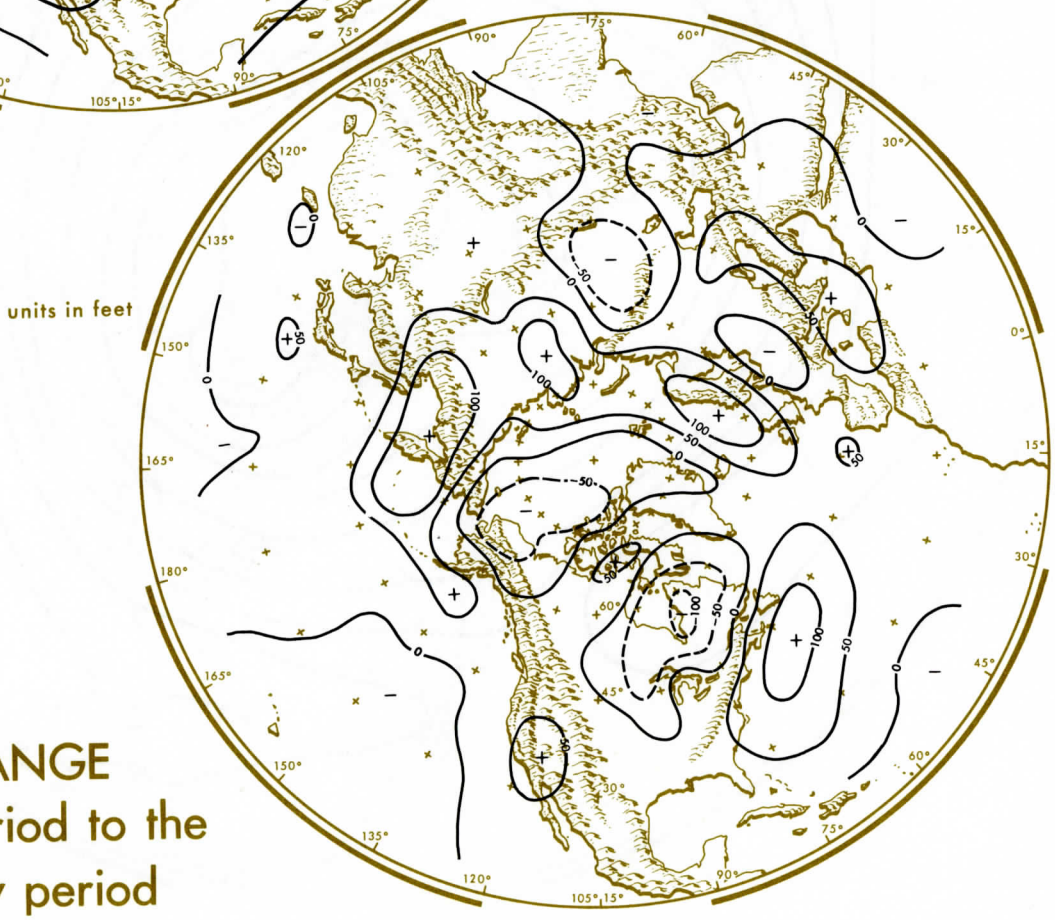
700 millibar
AVERAGE HEIGHT
June 15-19



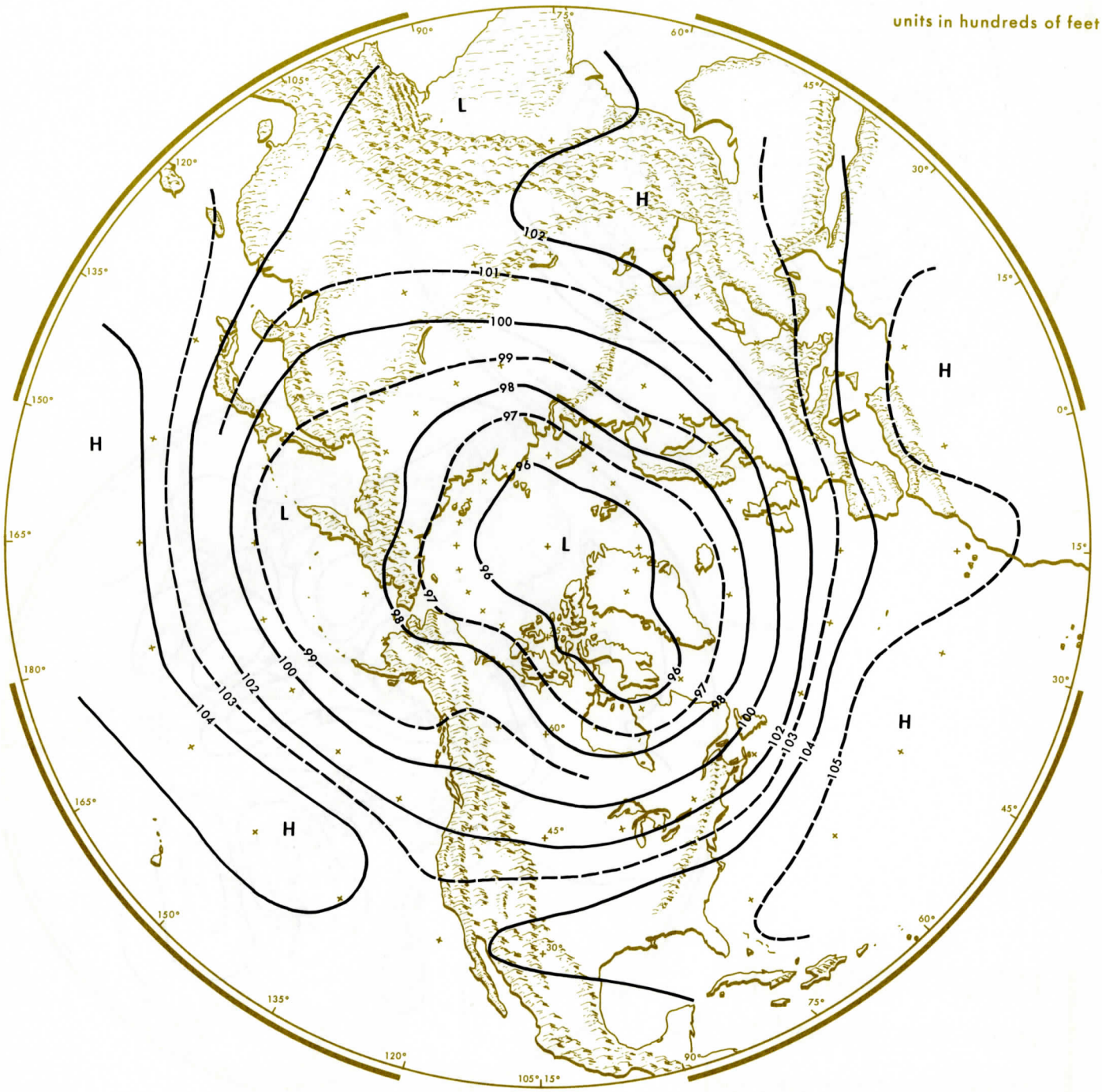
700 millibar height
STANDARD DEVIATION



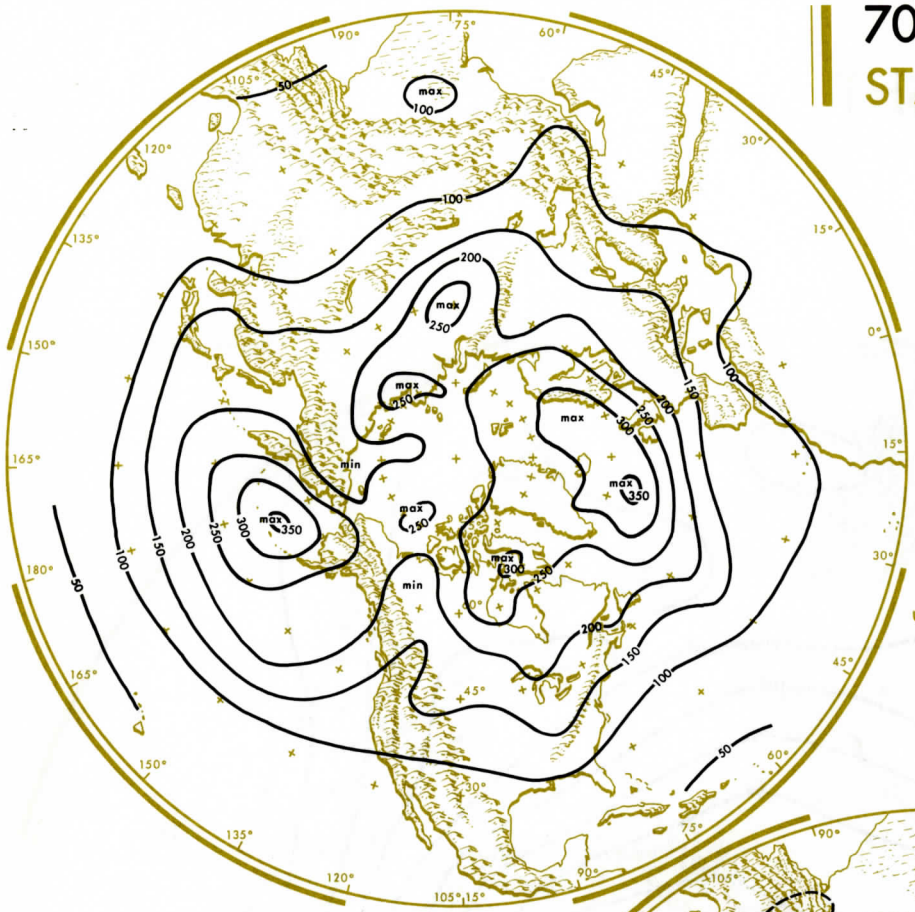
HEIGHT CHANGE
from this period to the next five-day period



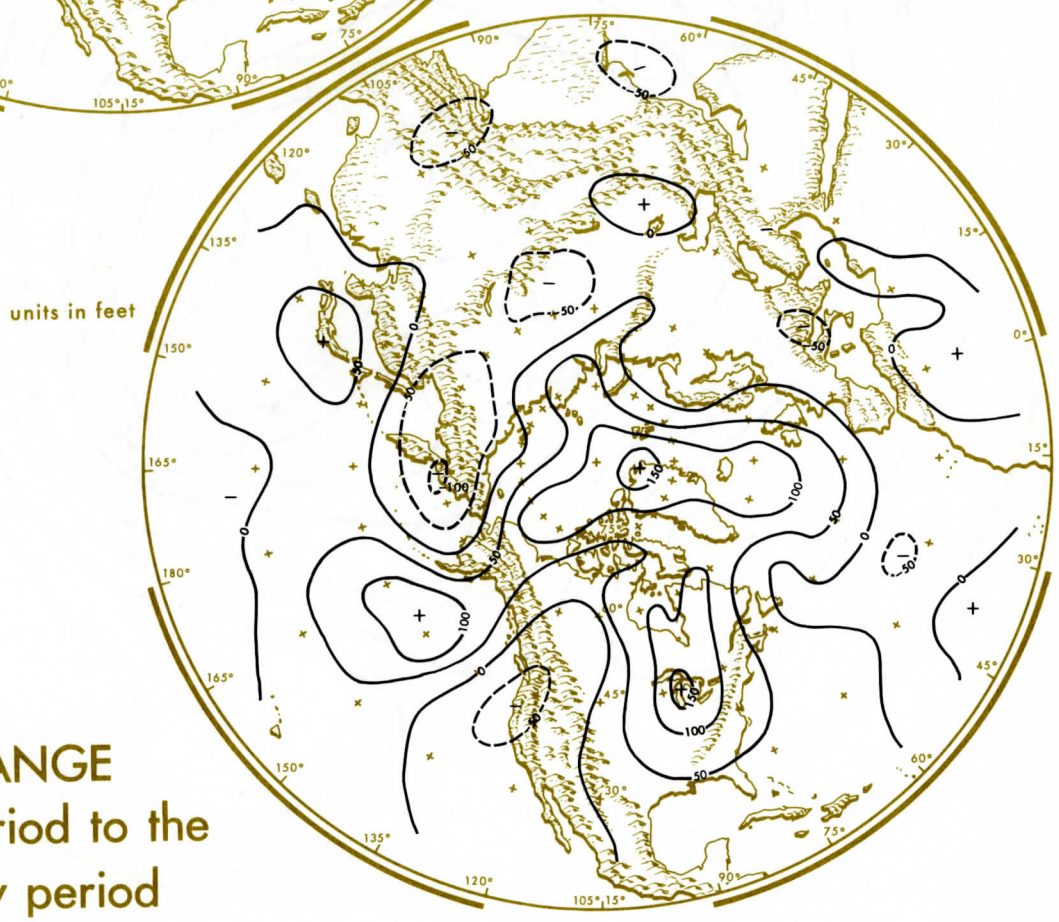
700 millibar
AVERAGE HEIGHT
June 20-24



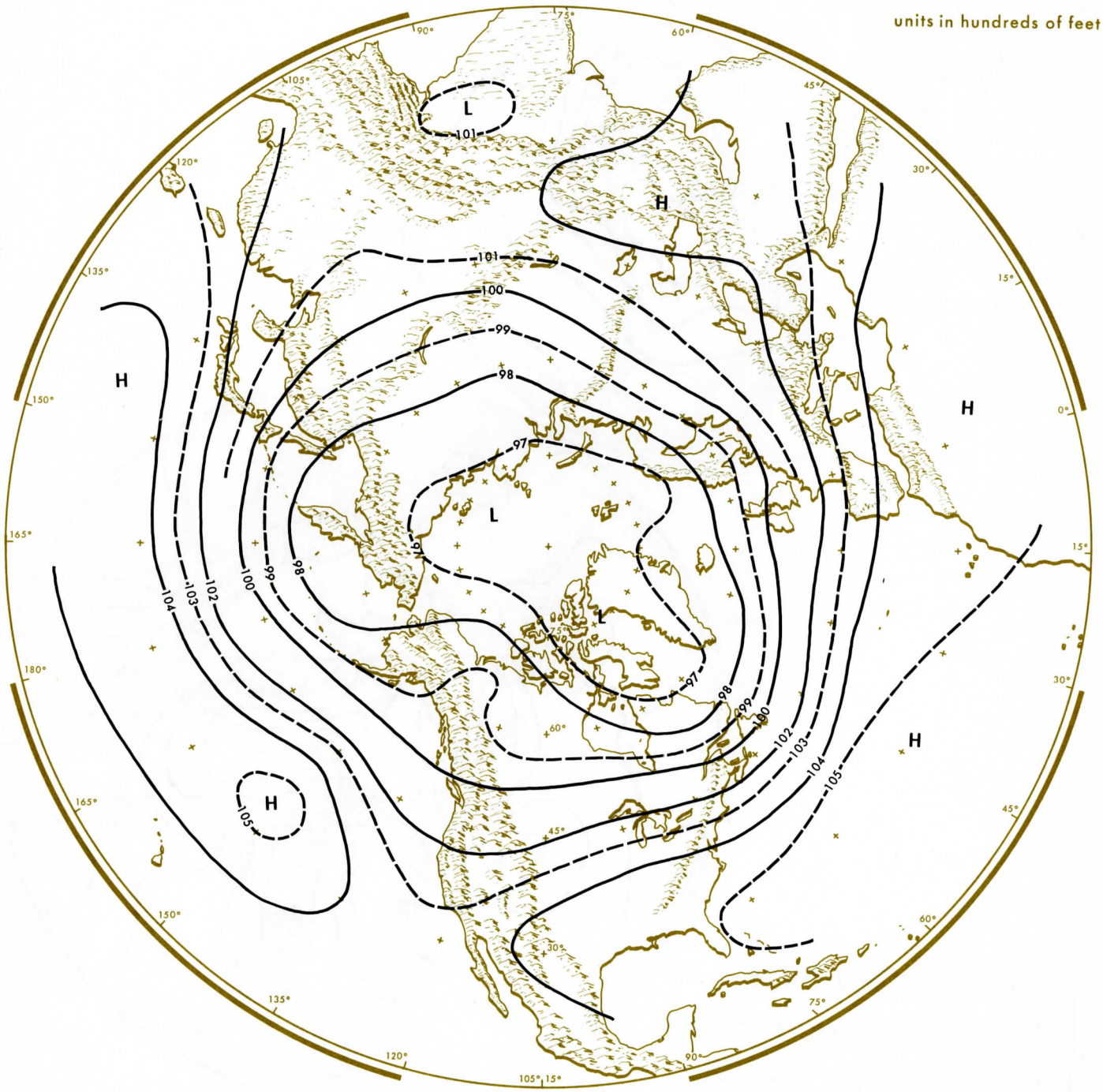
700 millibar height
STANDARD DEVIATION



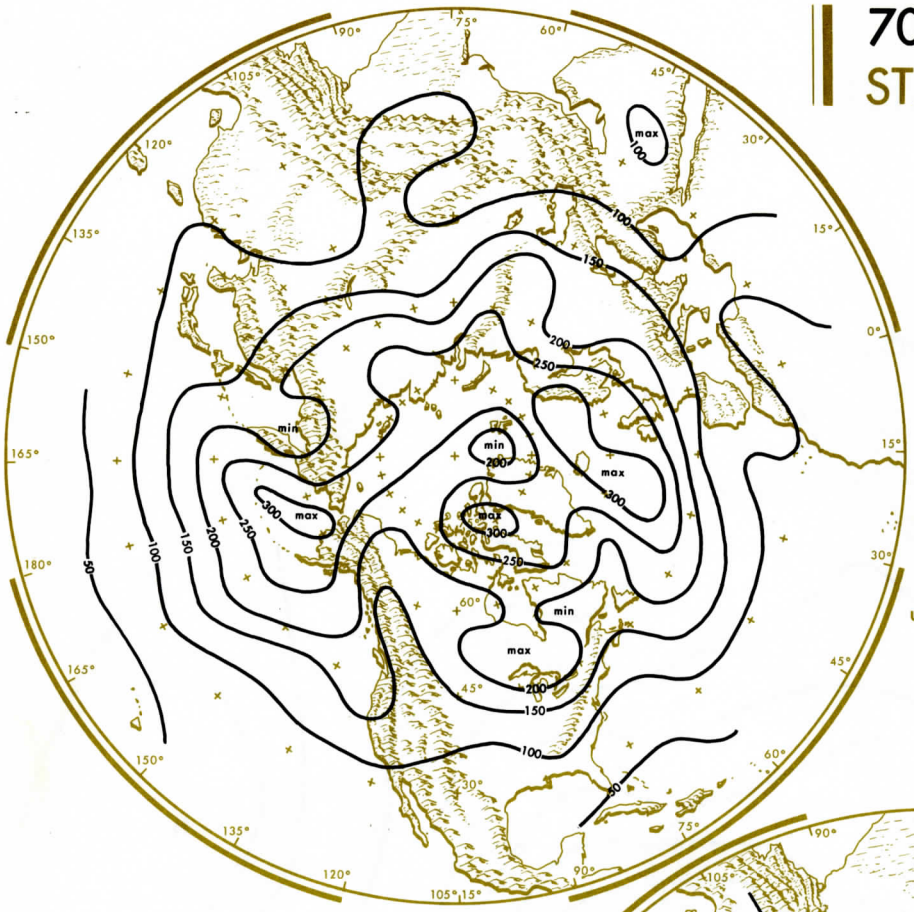
HEIGHT CHANGE
from this period to the next five-day period



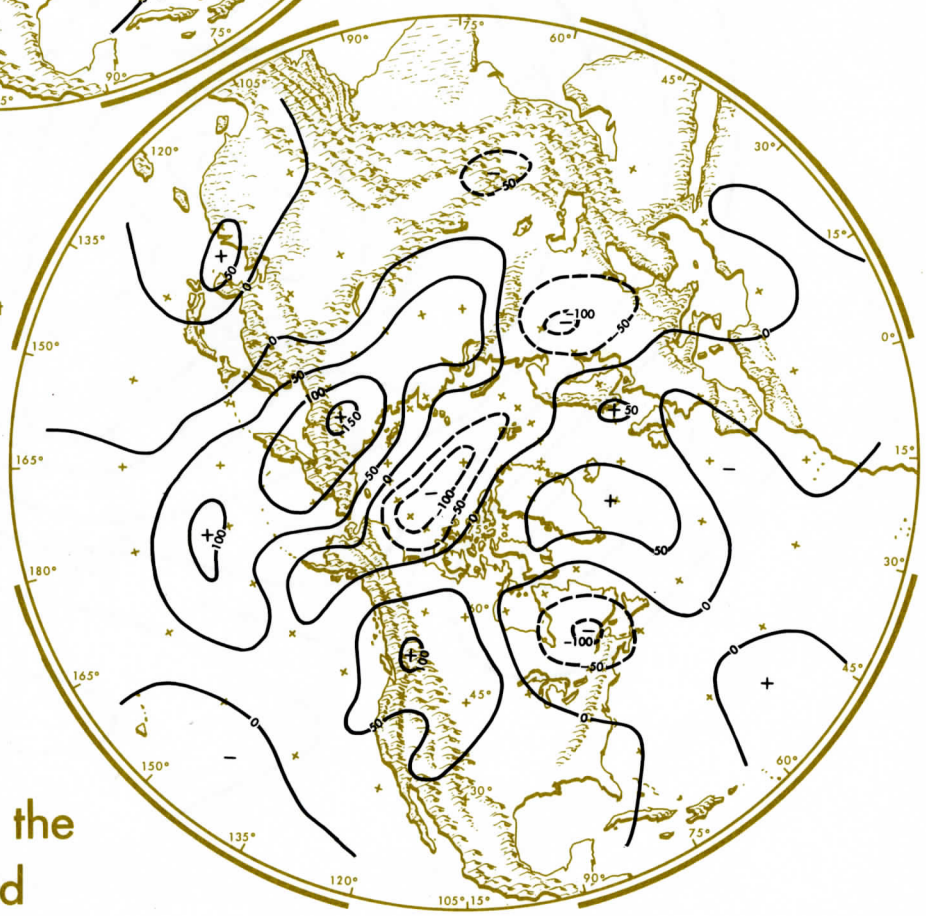
700 millibar
AVERAGE HEIGHT
June 25-29



700 millibar height
STANDARD DEVIATION



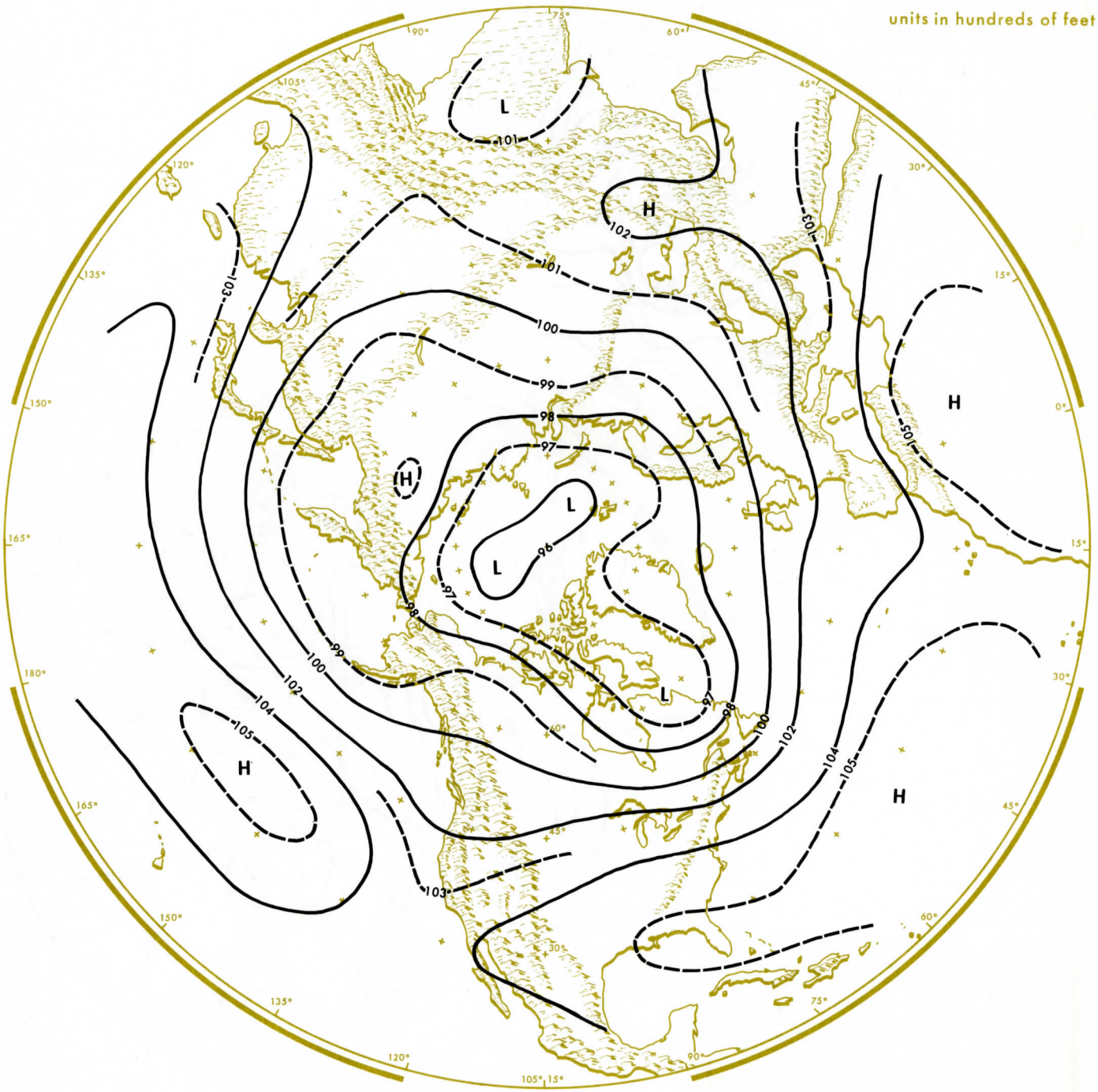
units in feet



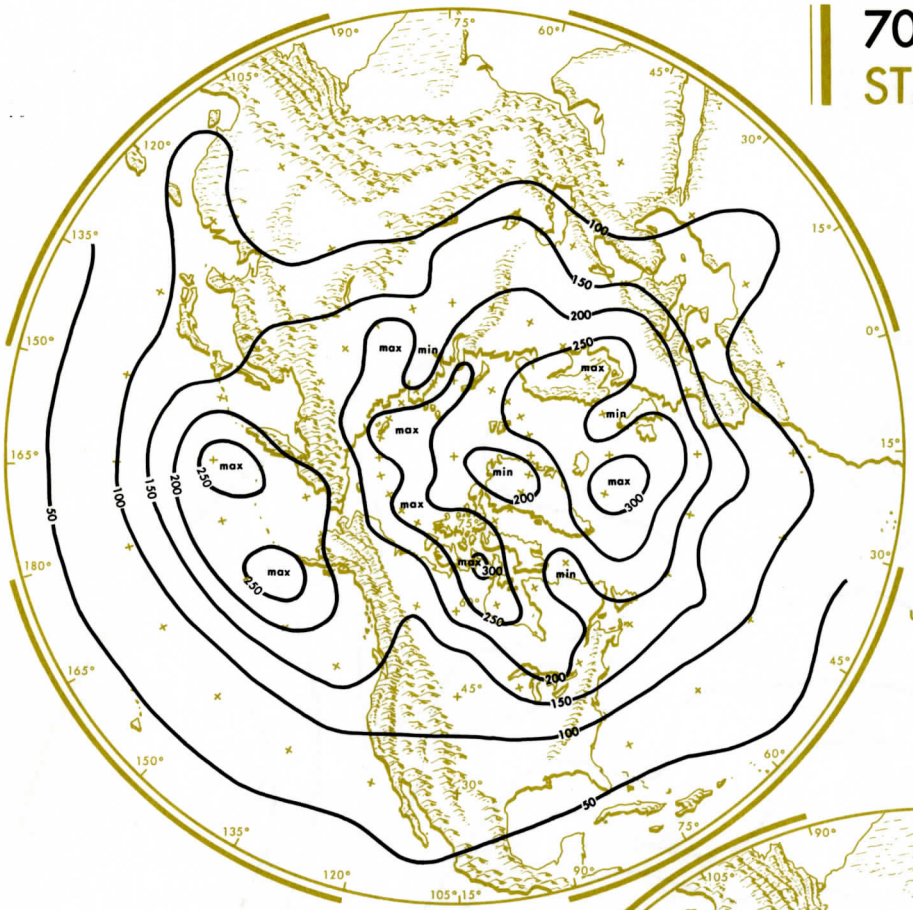
units in feet

HEIGHT CHANGE
from this period to the next five-day period

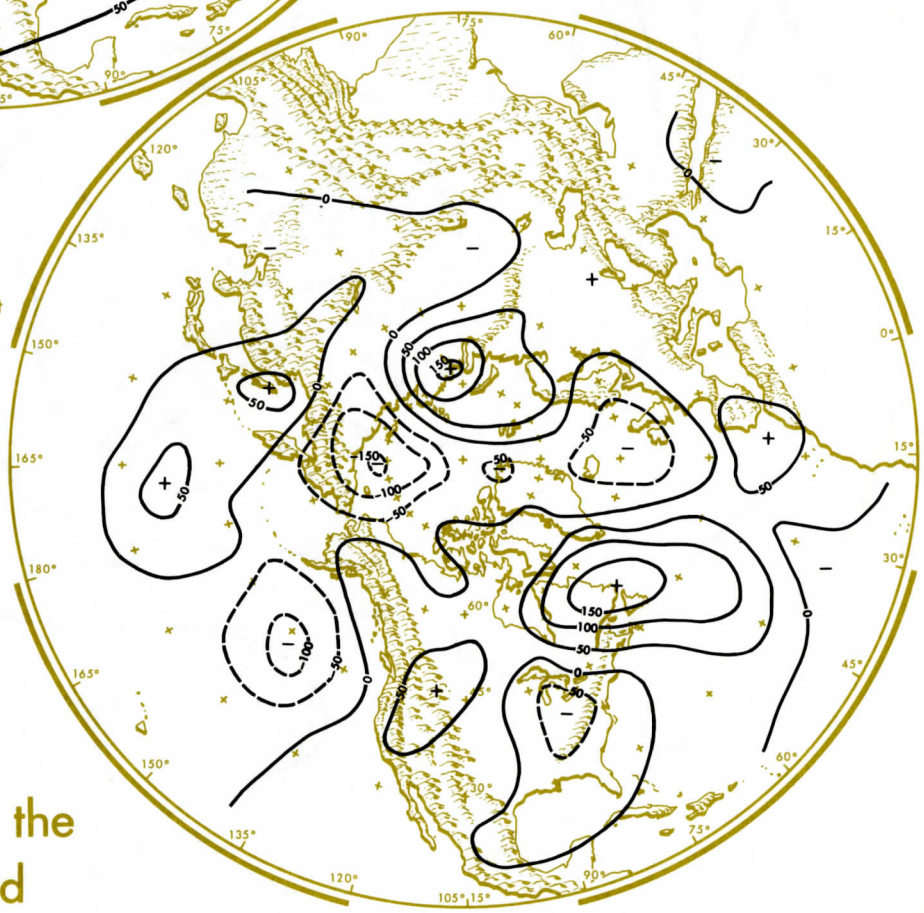
700 millibar
AVERAGE HEIGHT
June 30-July 4



700 millibar height
STANDARD DEVIATION



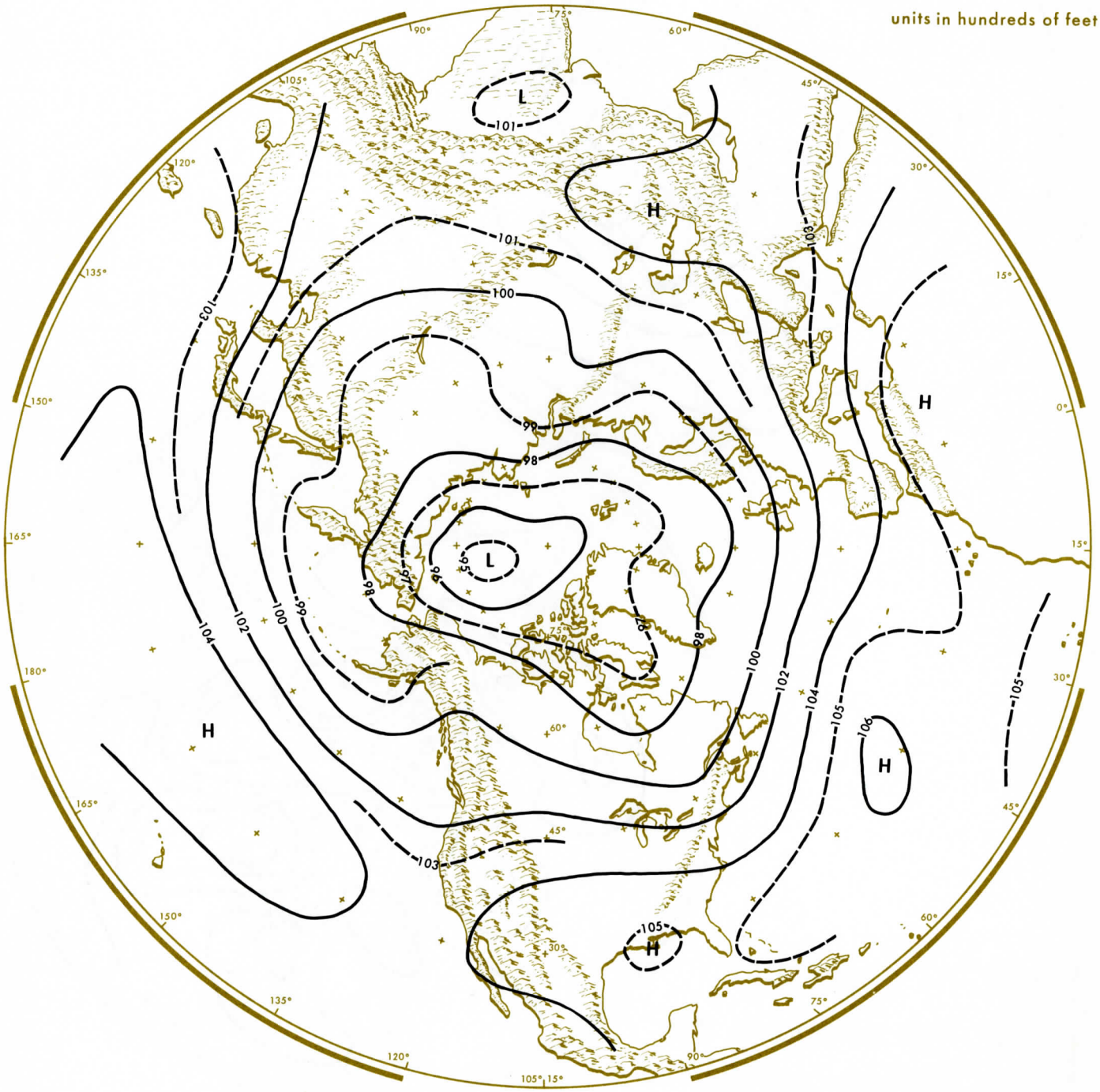
units in feet



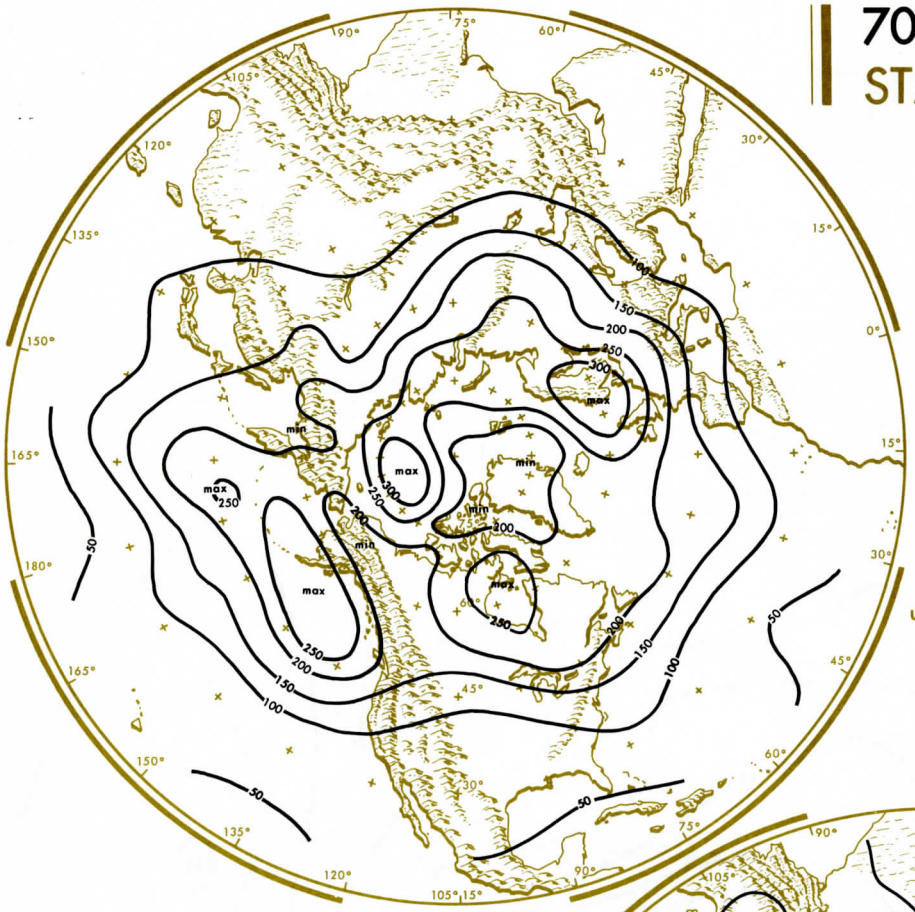
units in feet

HEIGHT CHANGE
from this period to the next five-day period

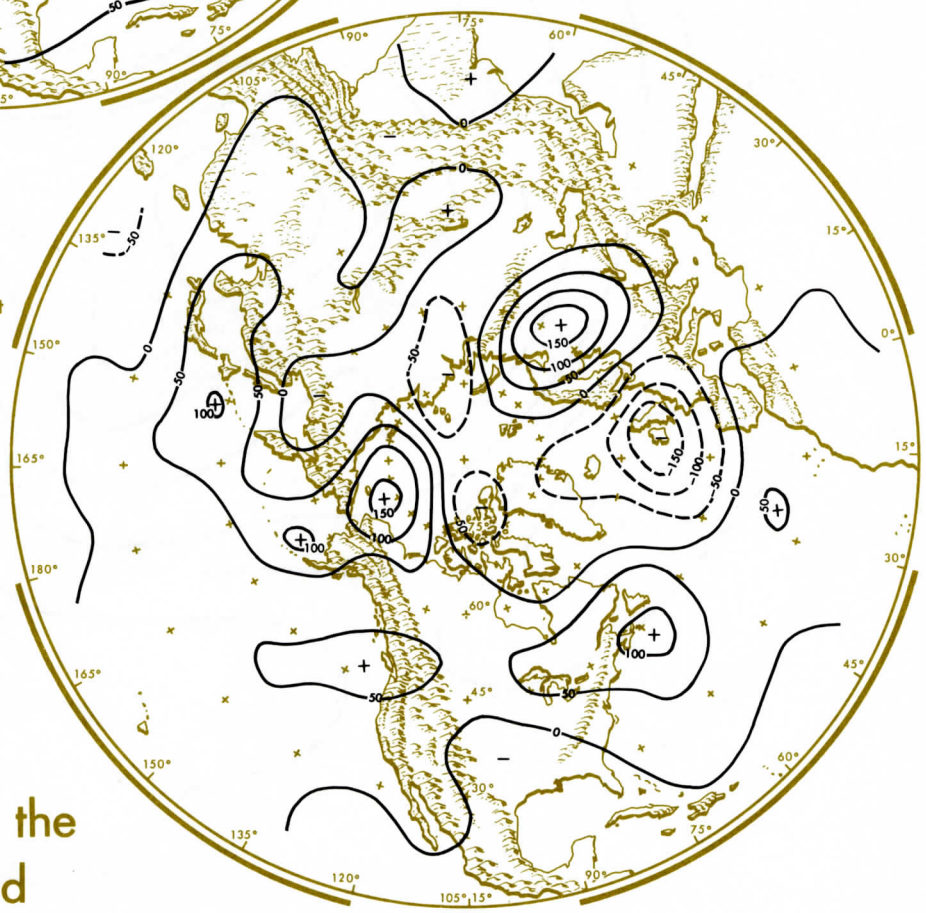
700 millibar
AVERAGE HEIGHT
July 5-9



700 millibar height
STANDARD DEVIATION



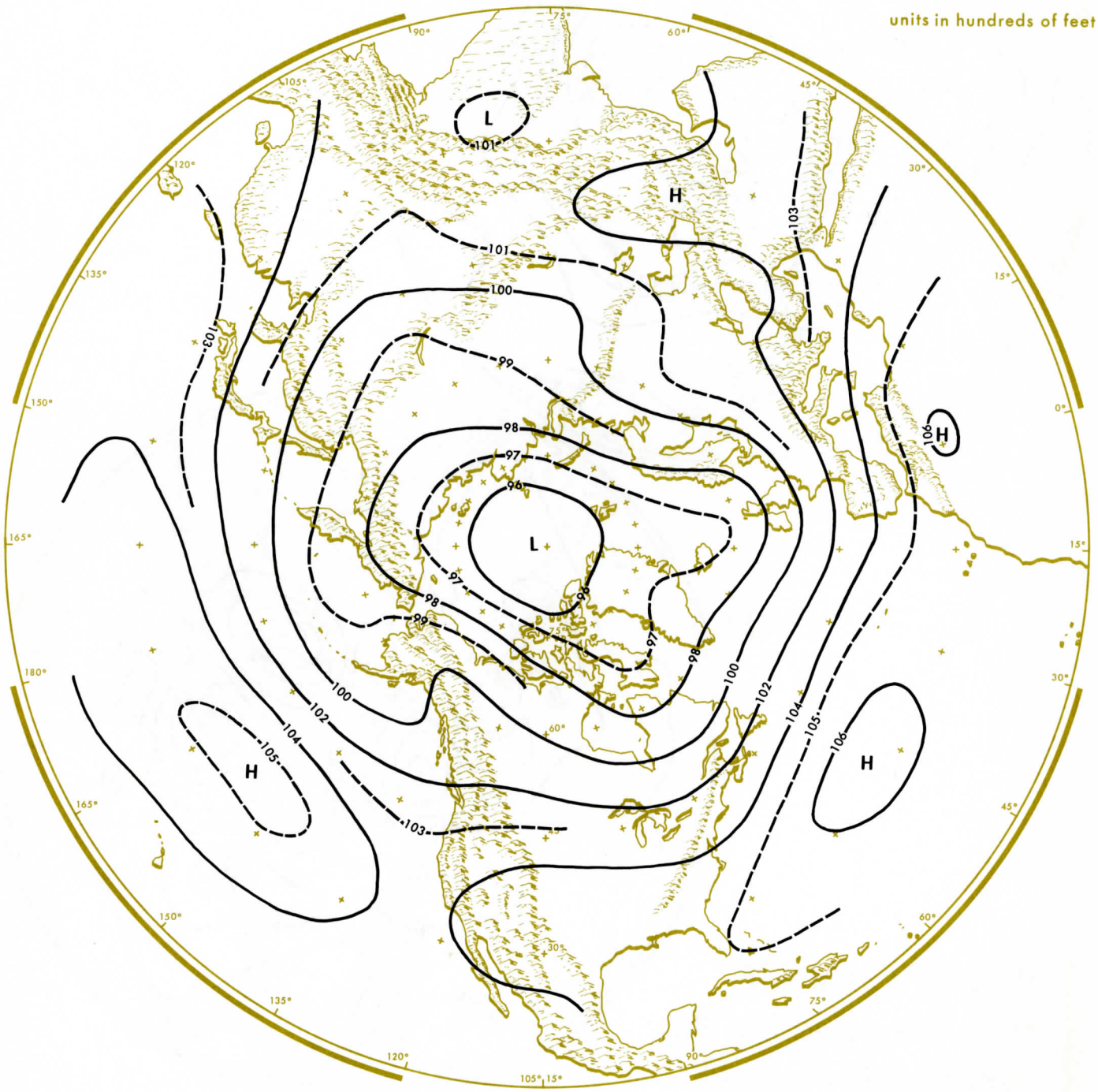
units in feet



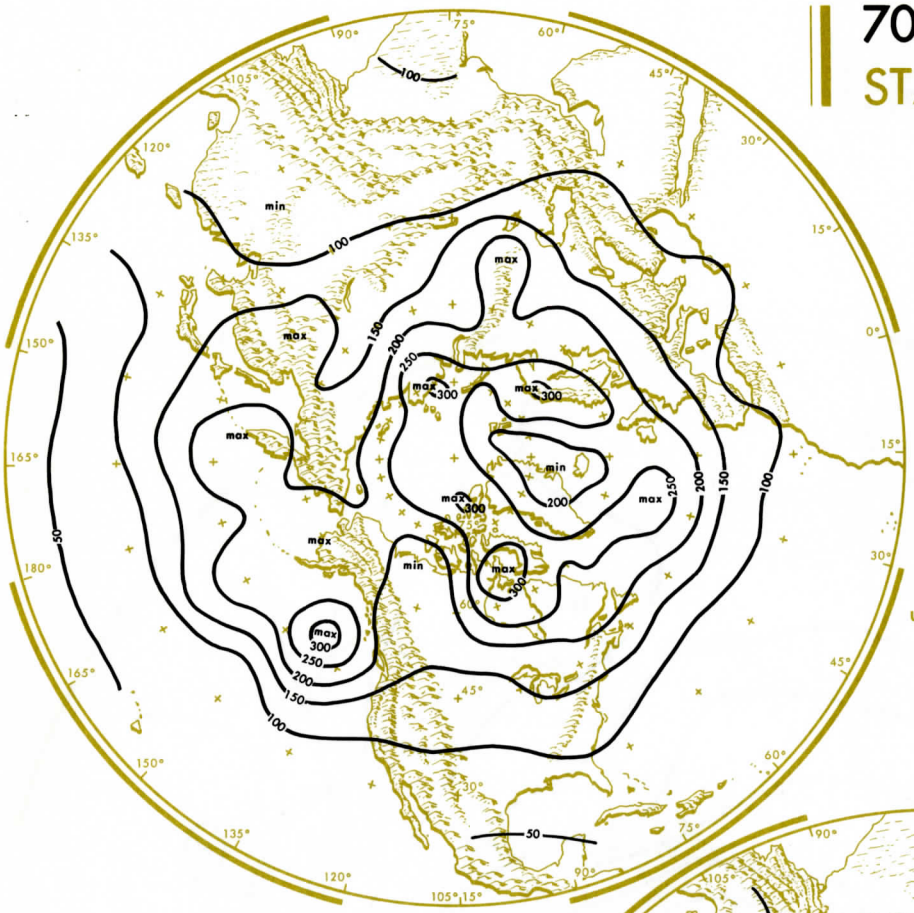
units in feet

HEIGHT CHANGE
from this period to the next five-day period

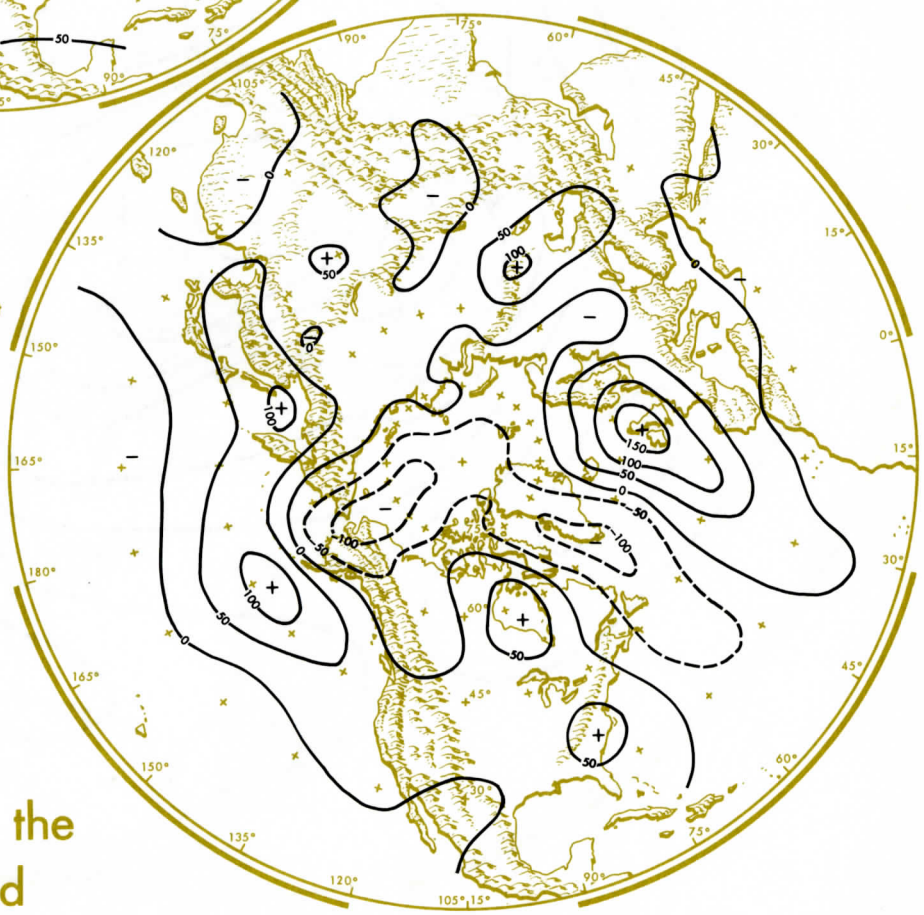
700 millibar
AVERAGE HEIGHT
July 10-14



700 millibar height
STANDARD DEVIATION



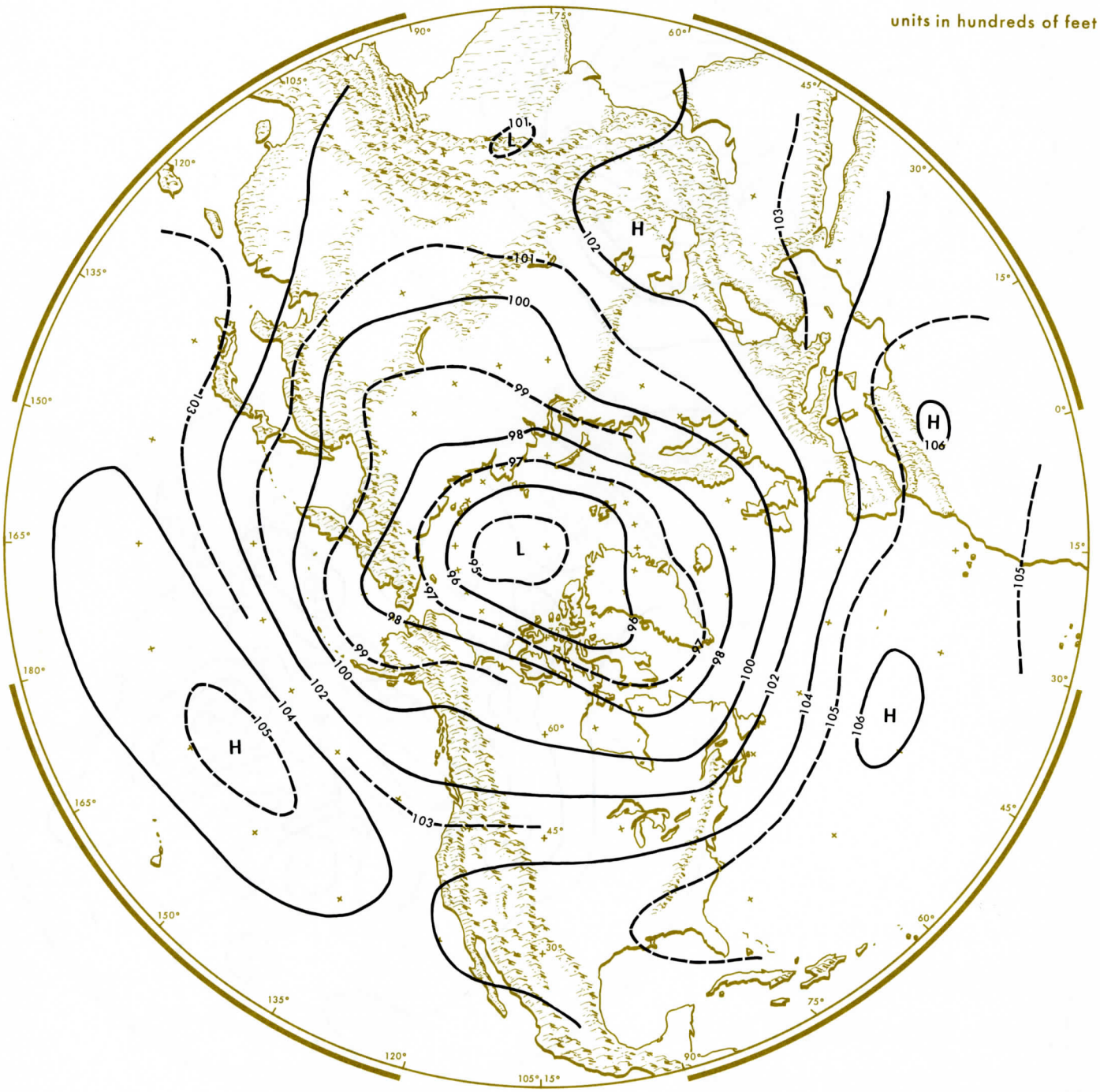
units in feet



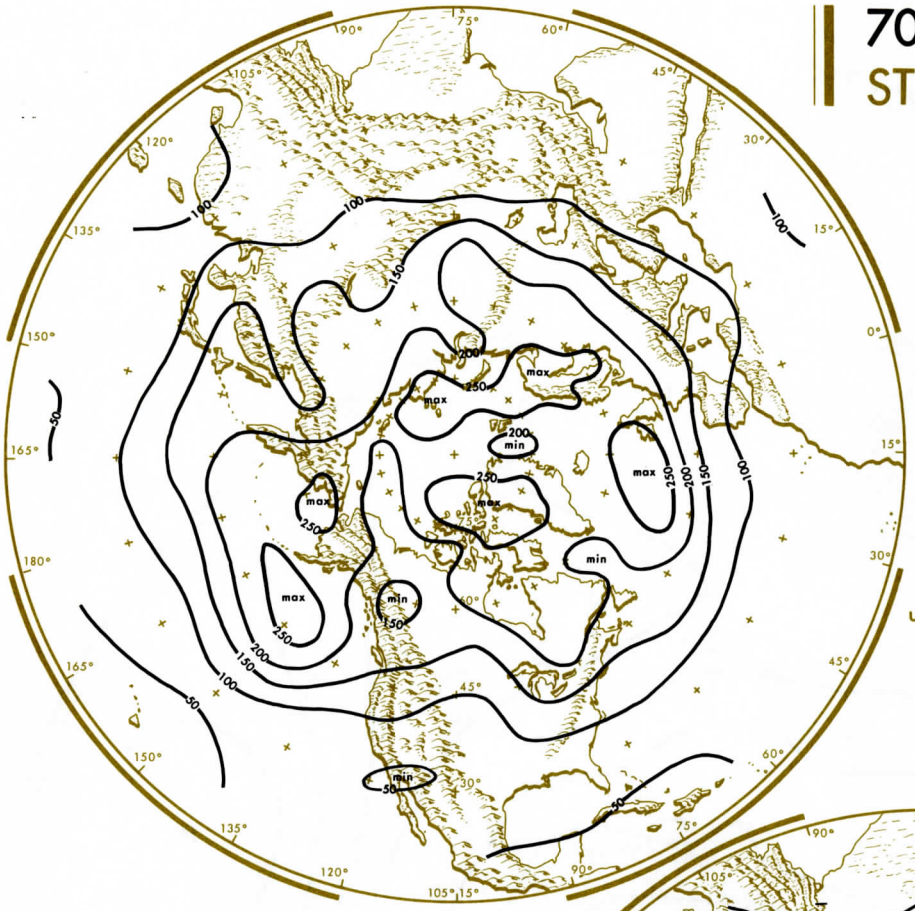
units in feet

HEIGHT CHANGE
from this period to the next five-day period

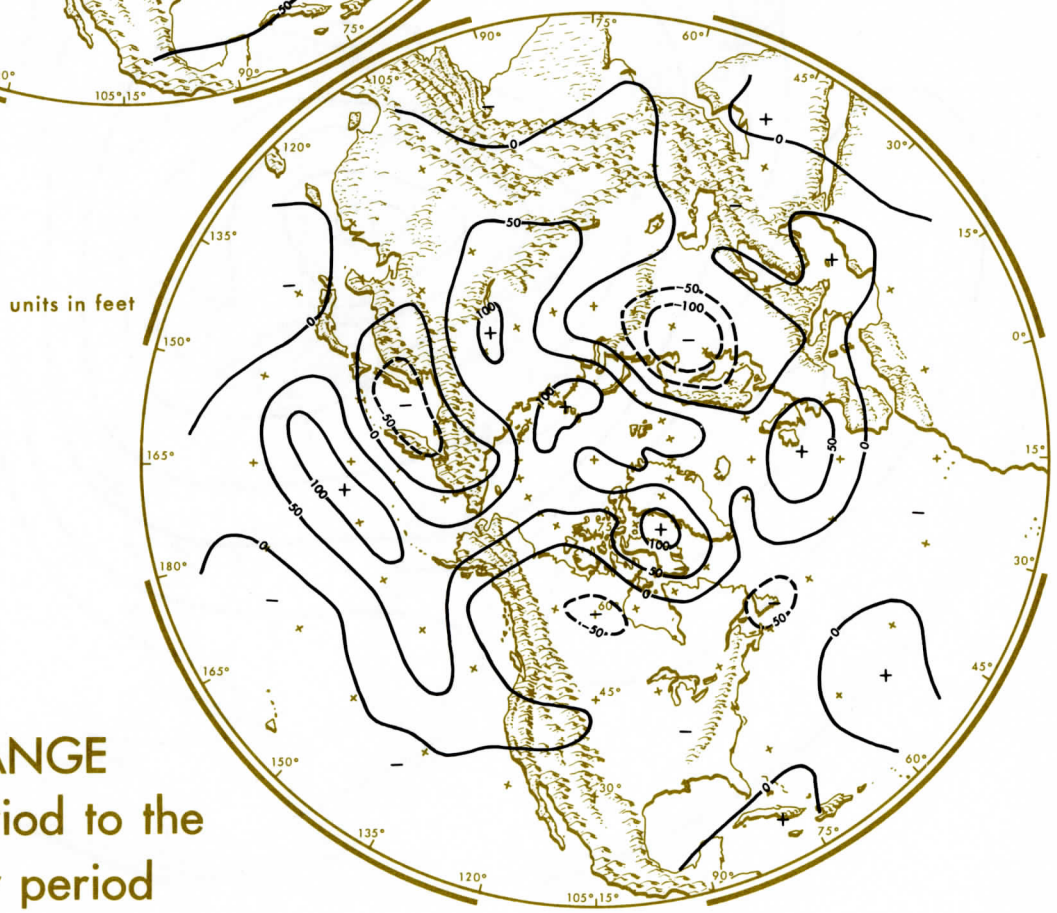
700 millibar
AVERAGE HEIGHT
July 15-19



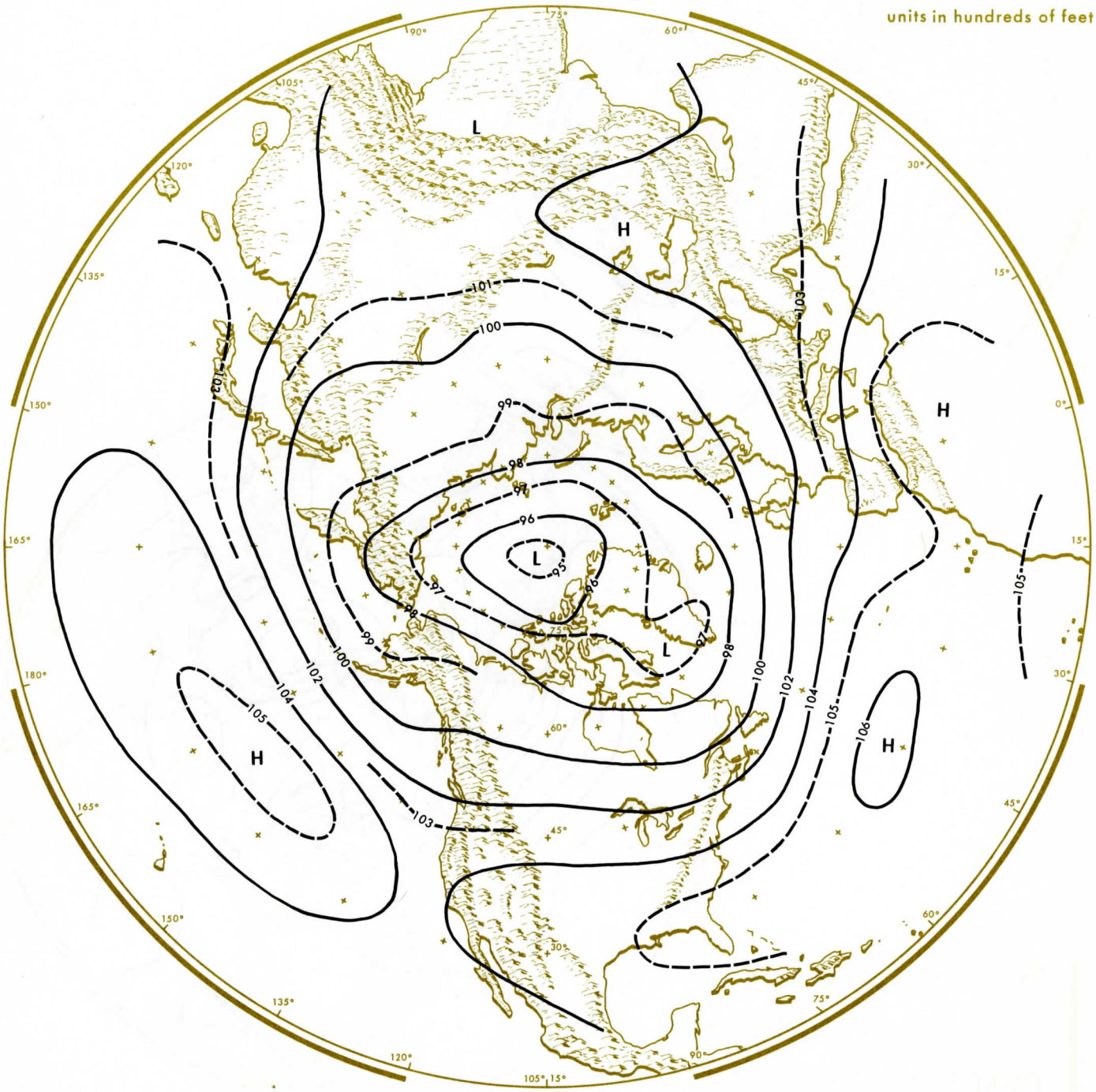
700 millibar height
STANDARD DEVIATION



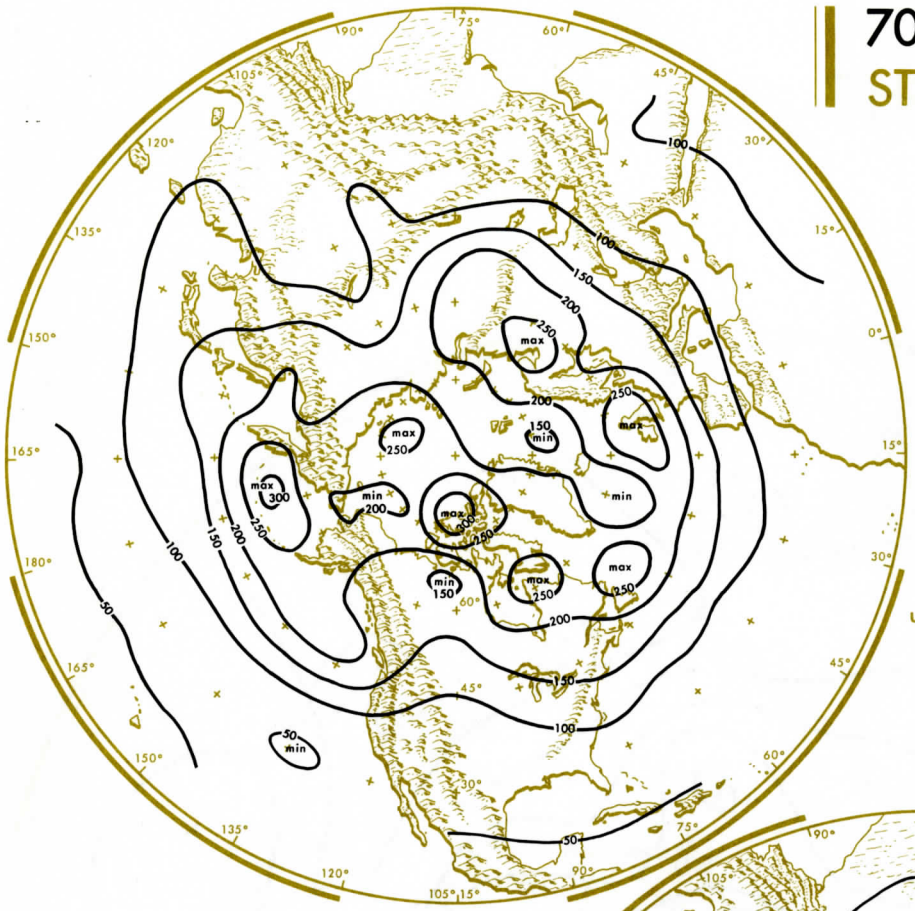
HEIGHT CHANGE
from this period to the next five-day period



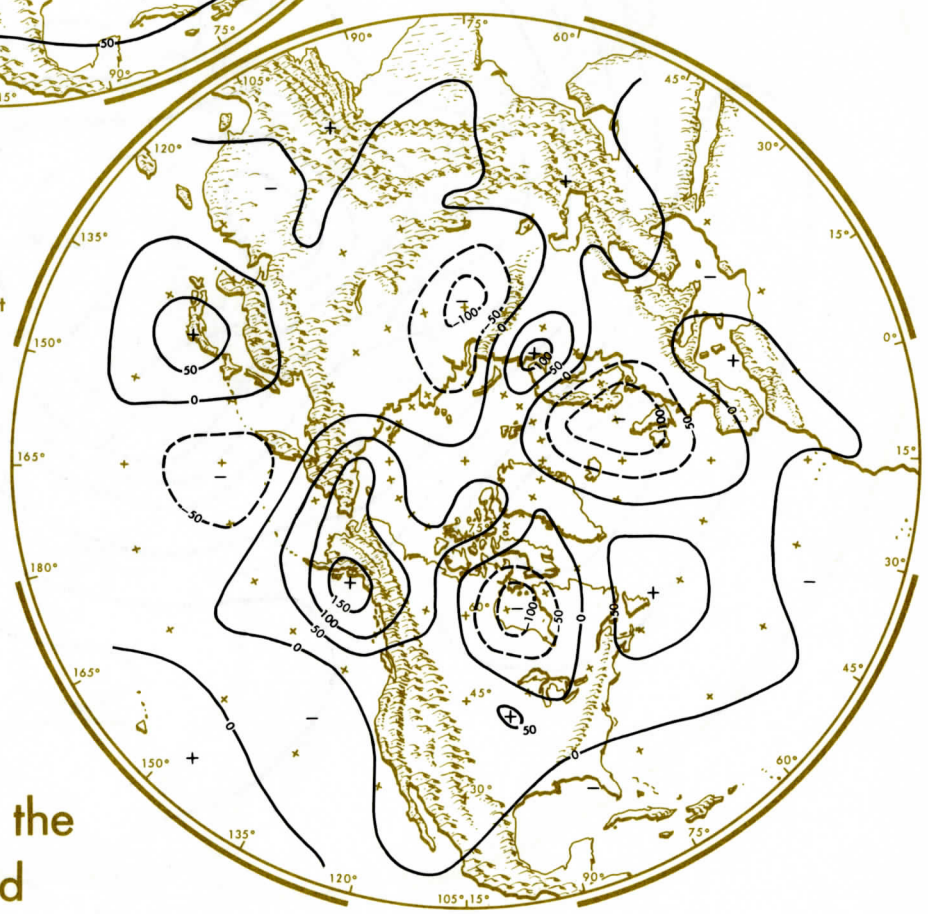
700 millibar
AVERAGE HEIGHT
July 20-24



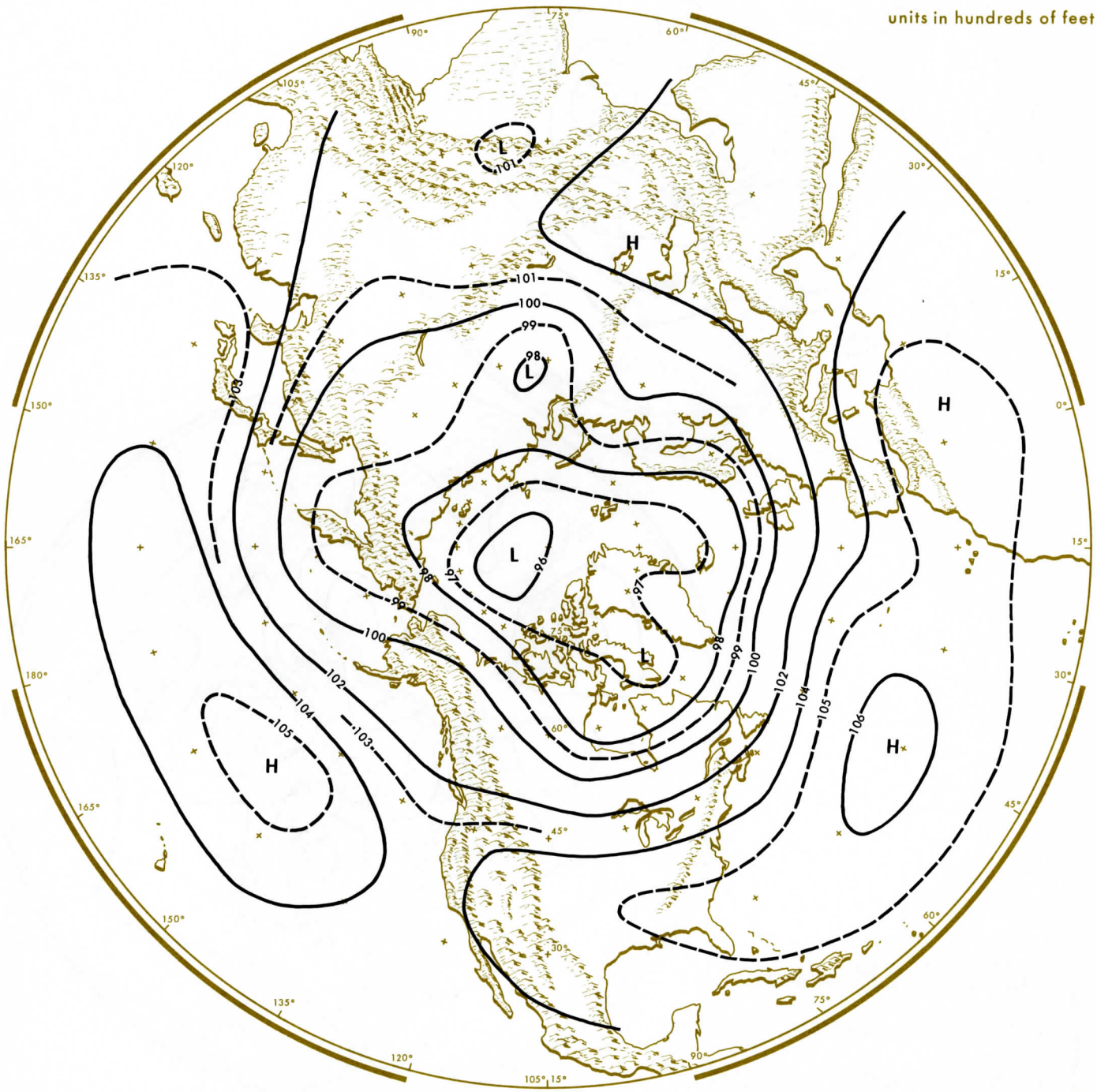
700 millibar height
STANDARD DEVIATION



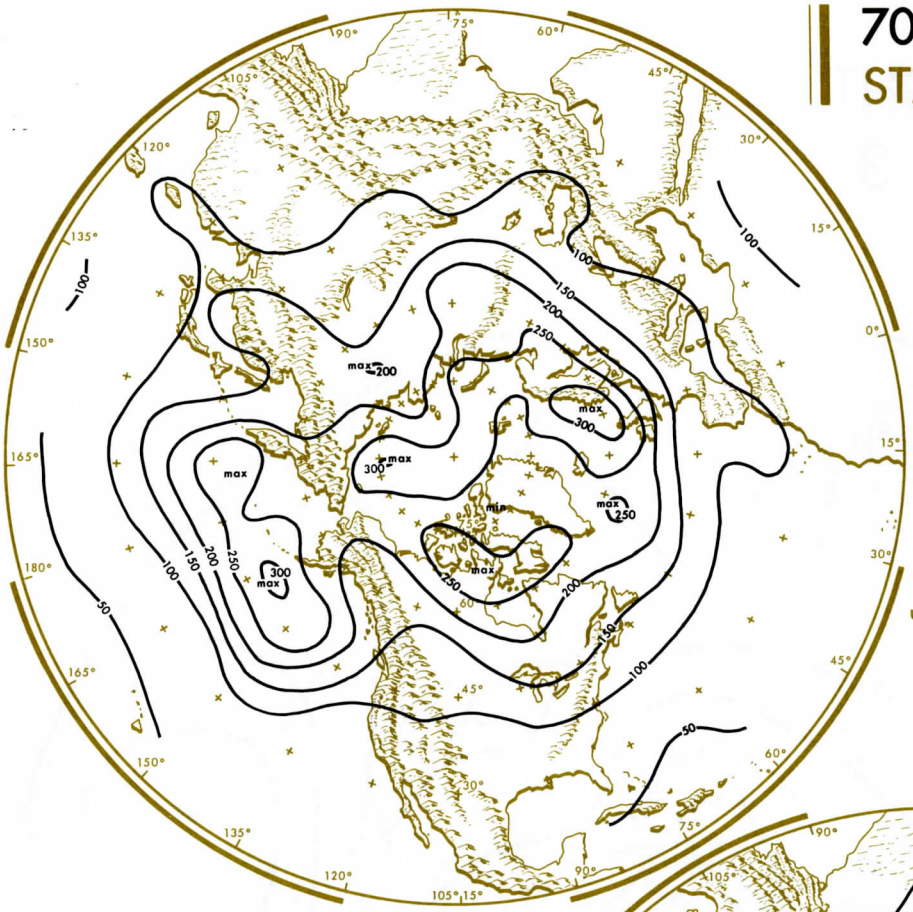
HEIGHT CHANGE
from this period to the next five-day period



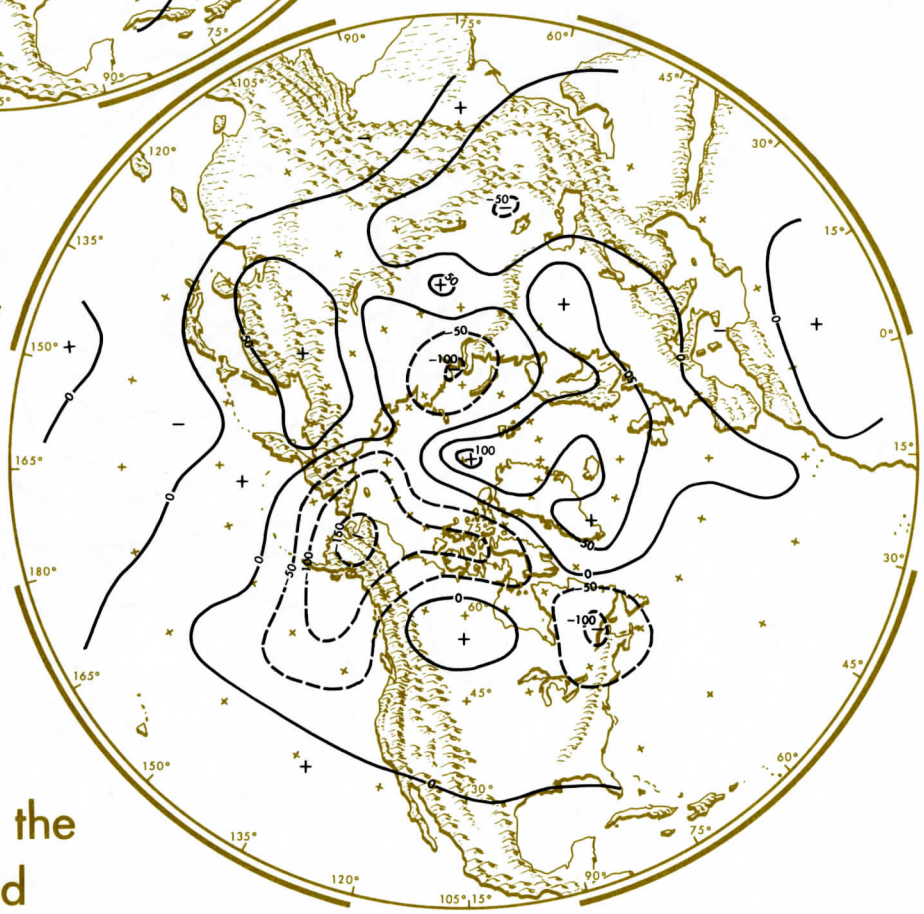
700 millibar
AVERAGE HEIGHT
July 25-29



700 millibar height
STANDARD DEVIATION



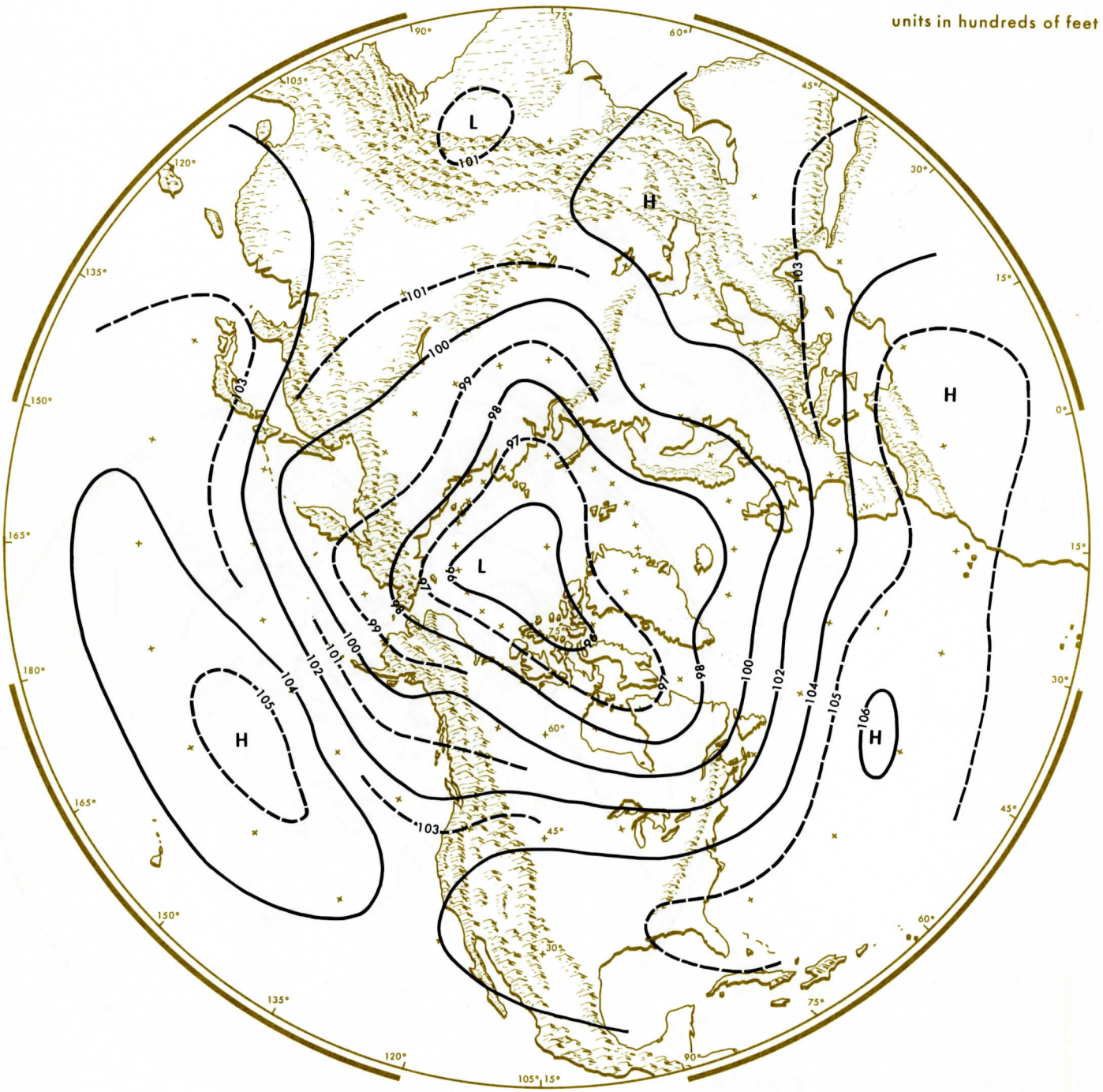
units in feet



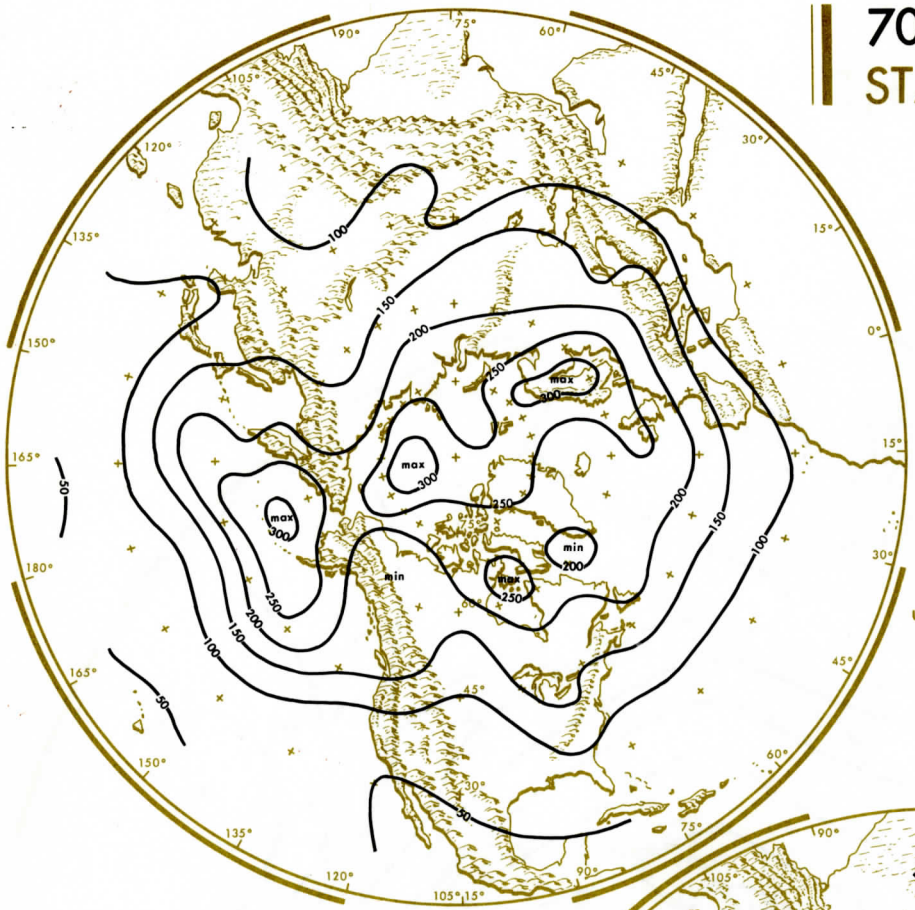
units in feet

HEIGHT CHANGE
from this period to the next five-day period

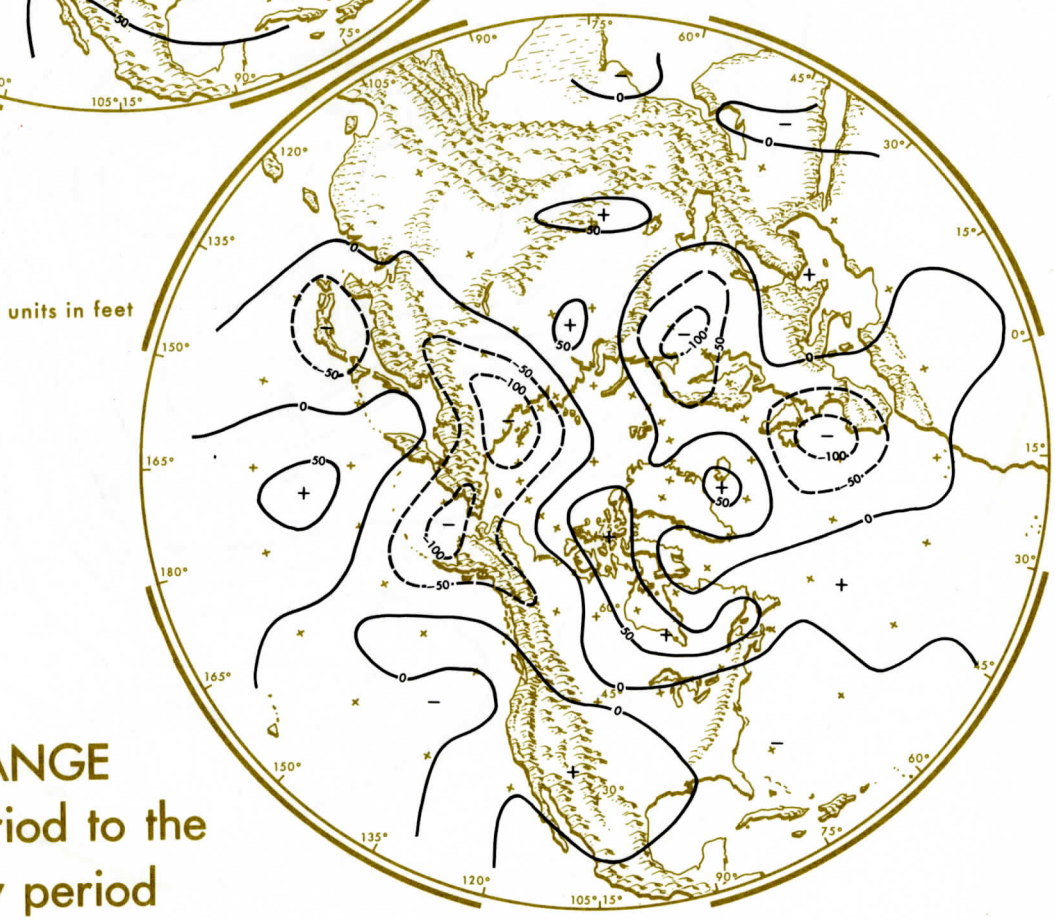
700 millibar
AVERAGE HEIGHT
July 30-August 3



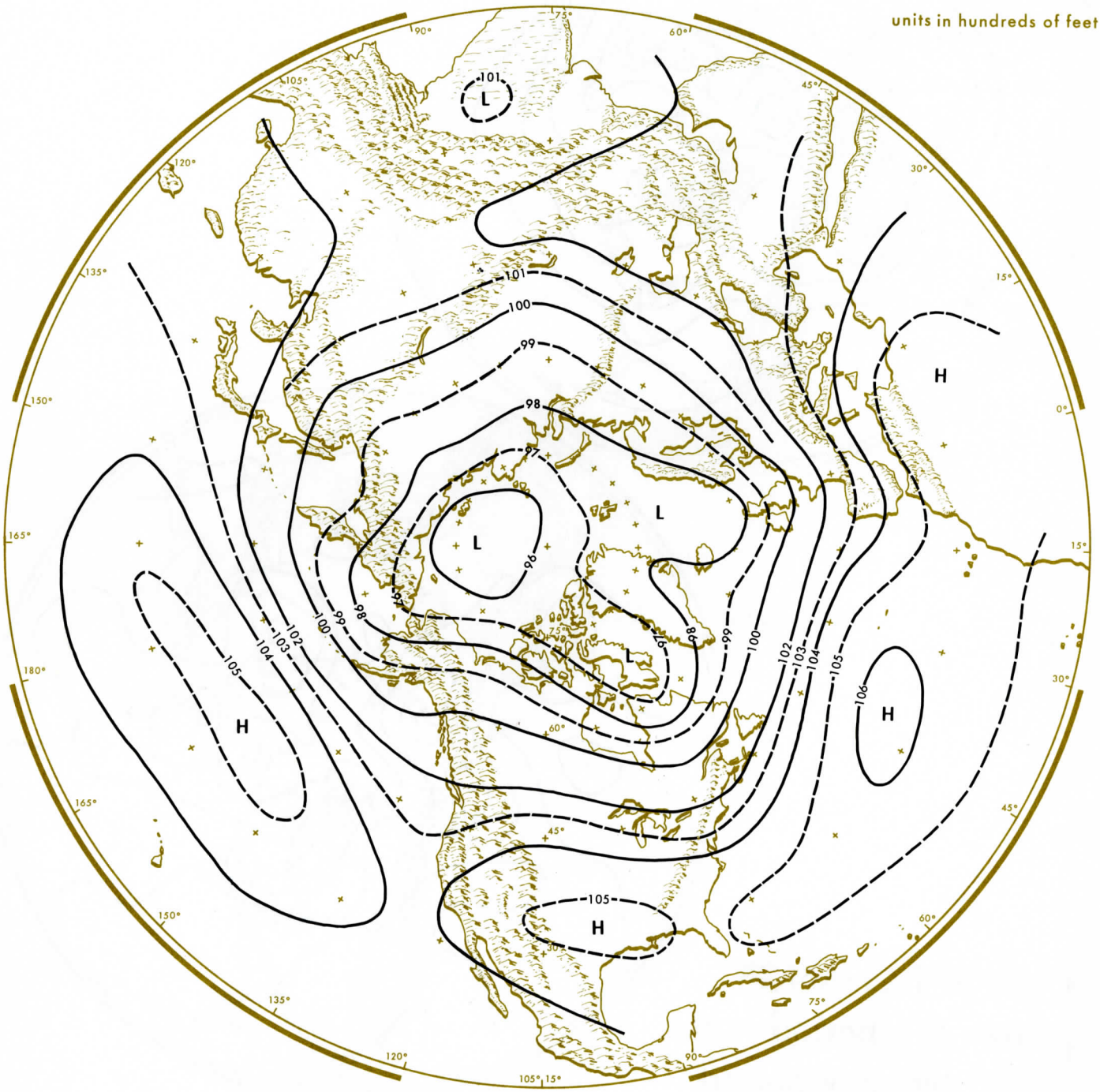
700 millibar height
STANDARD DEVIATION



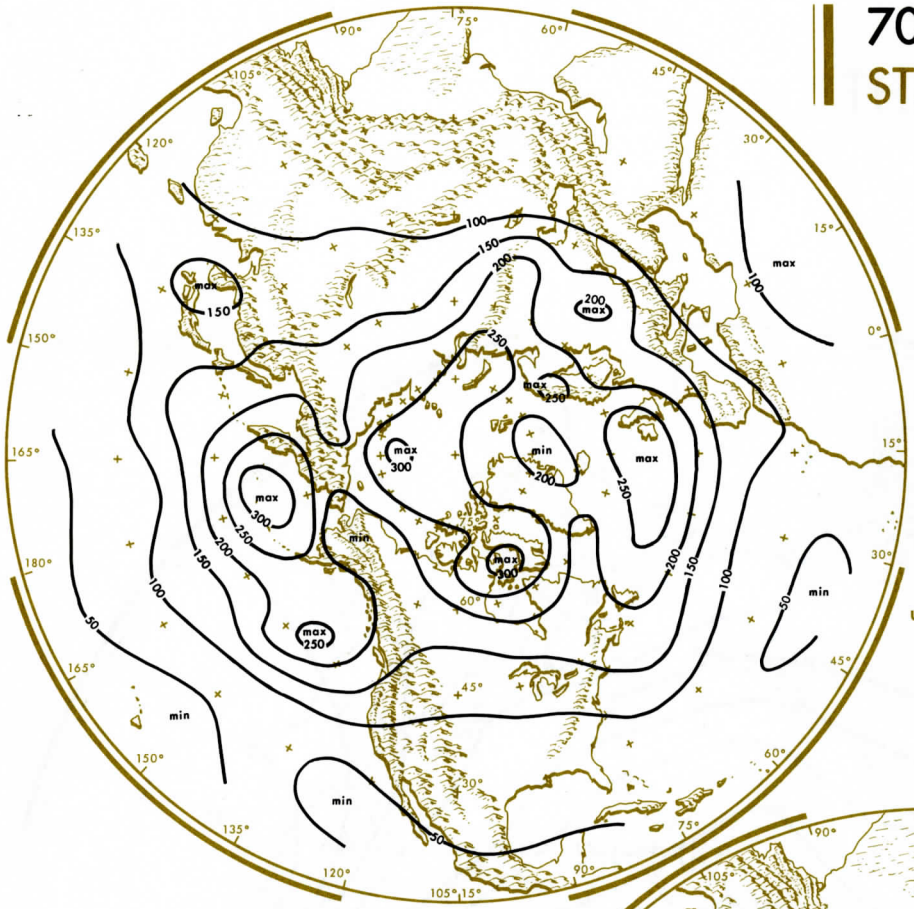
HEIGHT CHANGE
from this period to the next five-day period



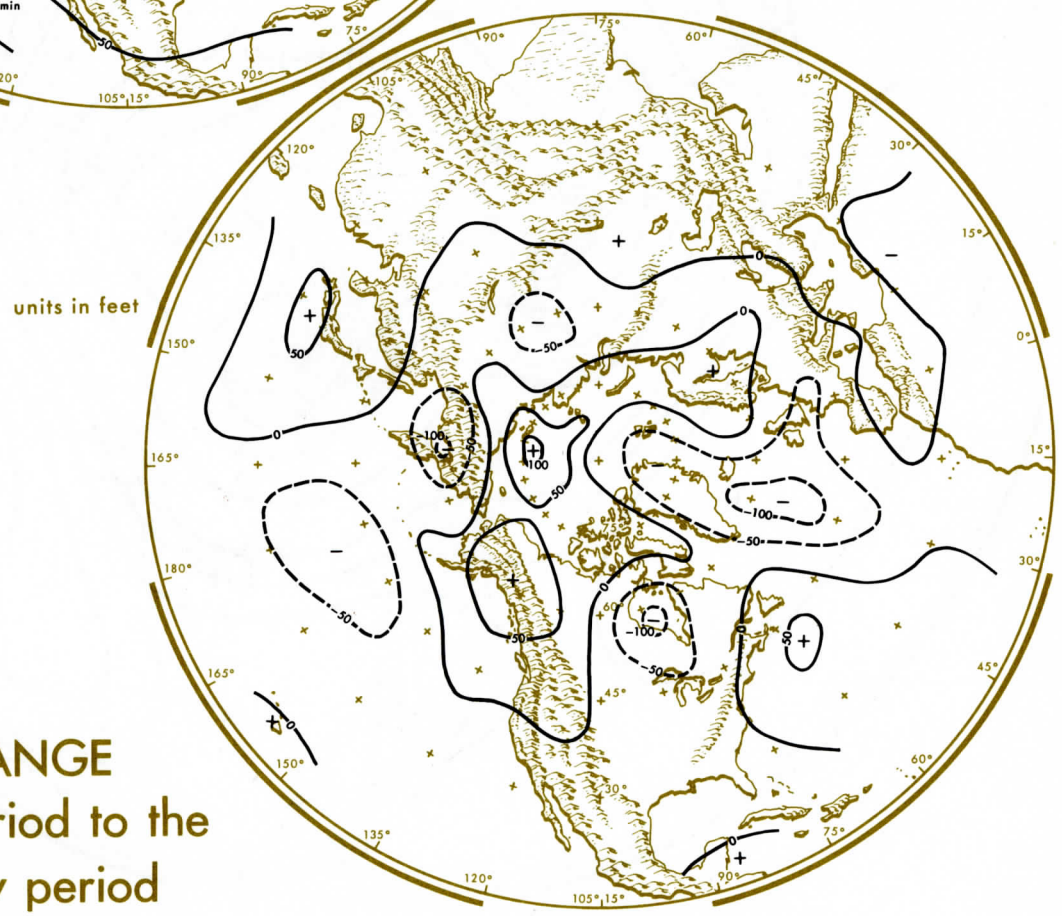
700 millibar
AVERAGE HEIGHT
August 4-8



700 millibar height
STANDARD DEVIATION



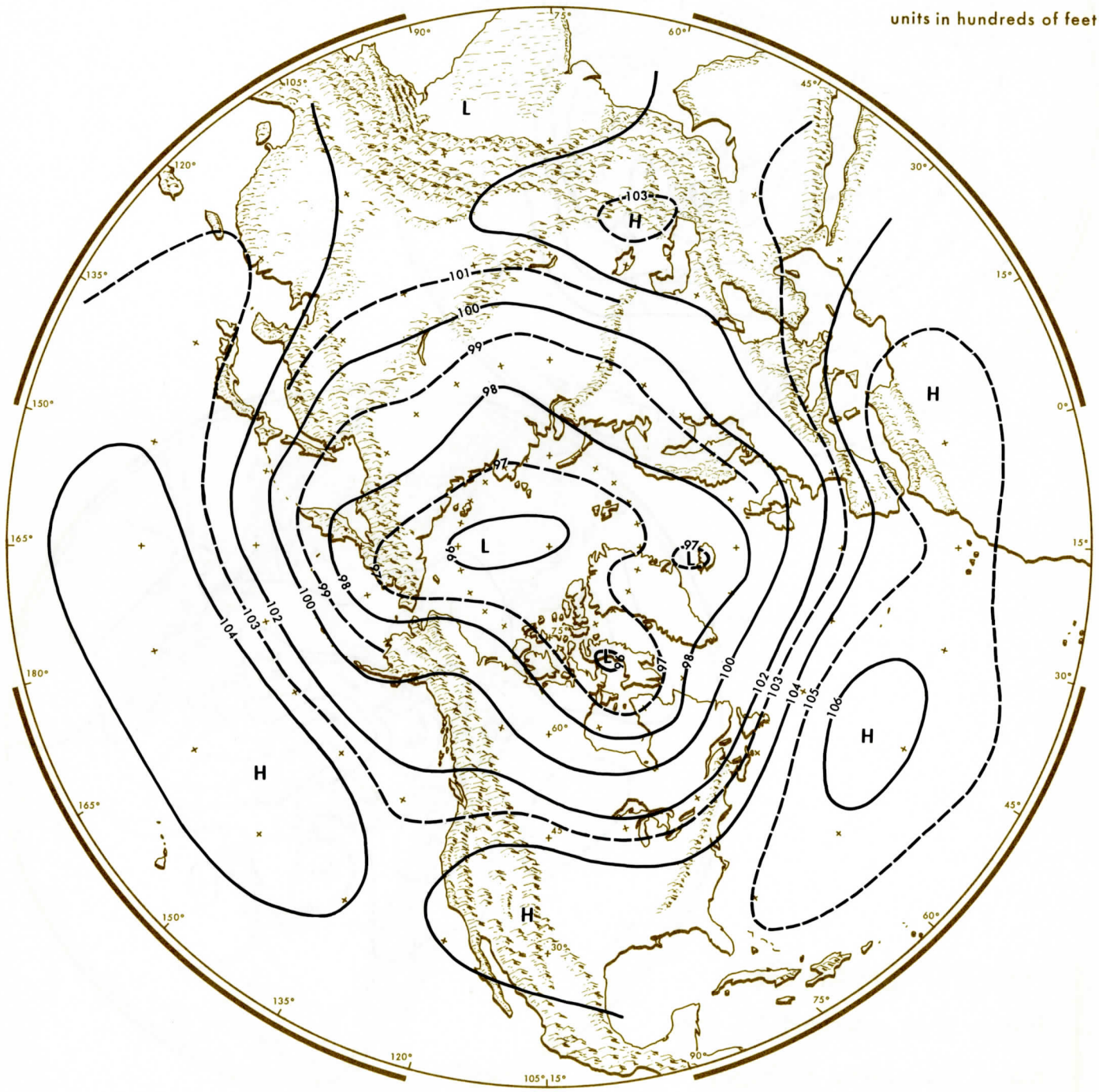
units in feet



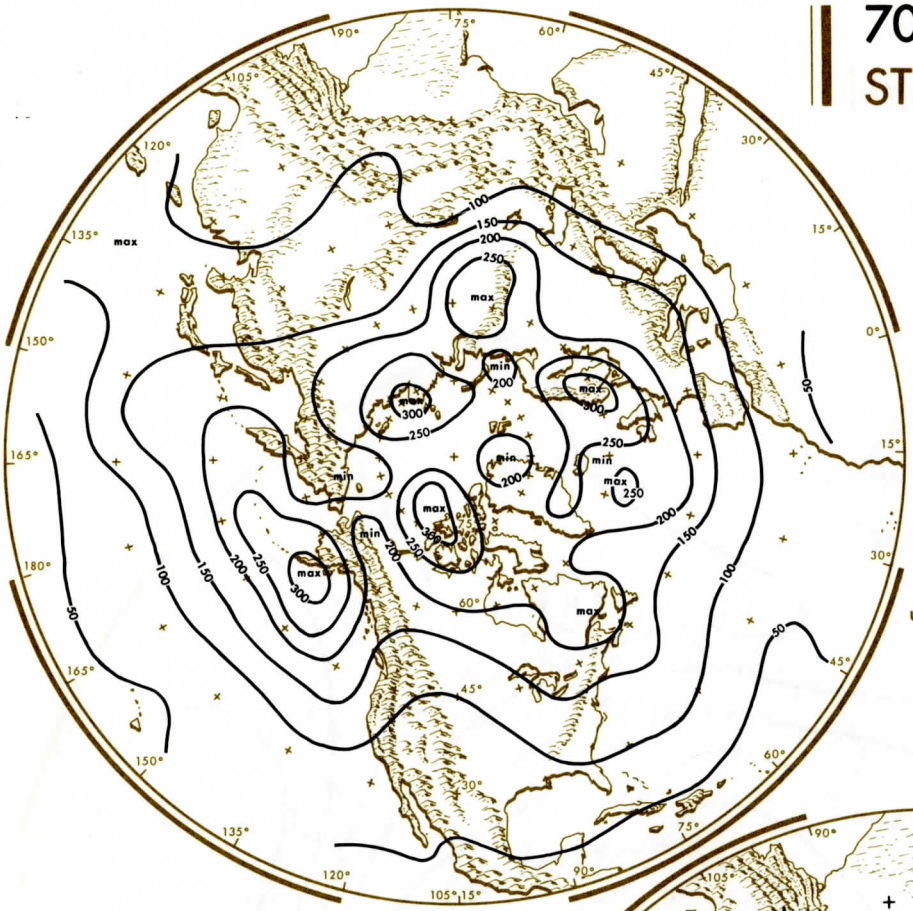
units in feet

HEIGHT CHANGE
from this period to the next five-day period

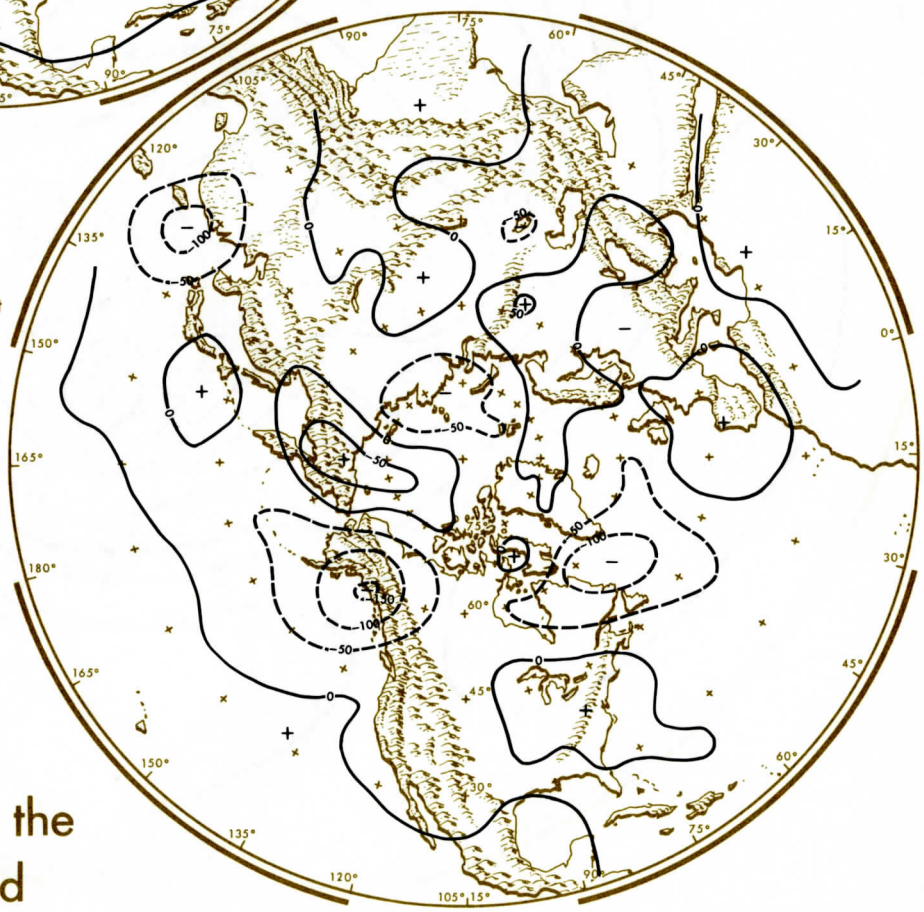
700 millibar
AVERAGE HEIGHT
August 9-13



700 millibar height
STANDARD DEVIATION



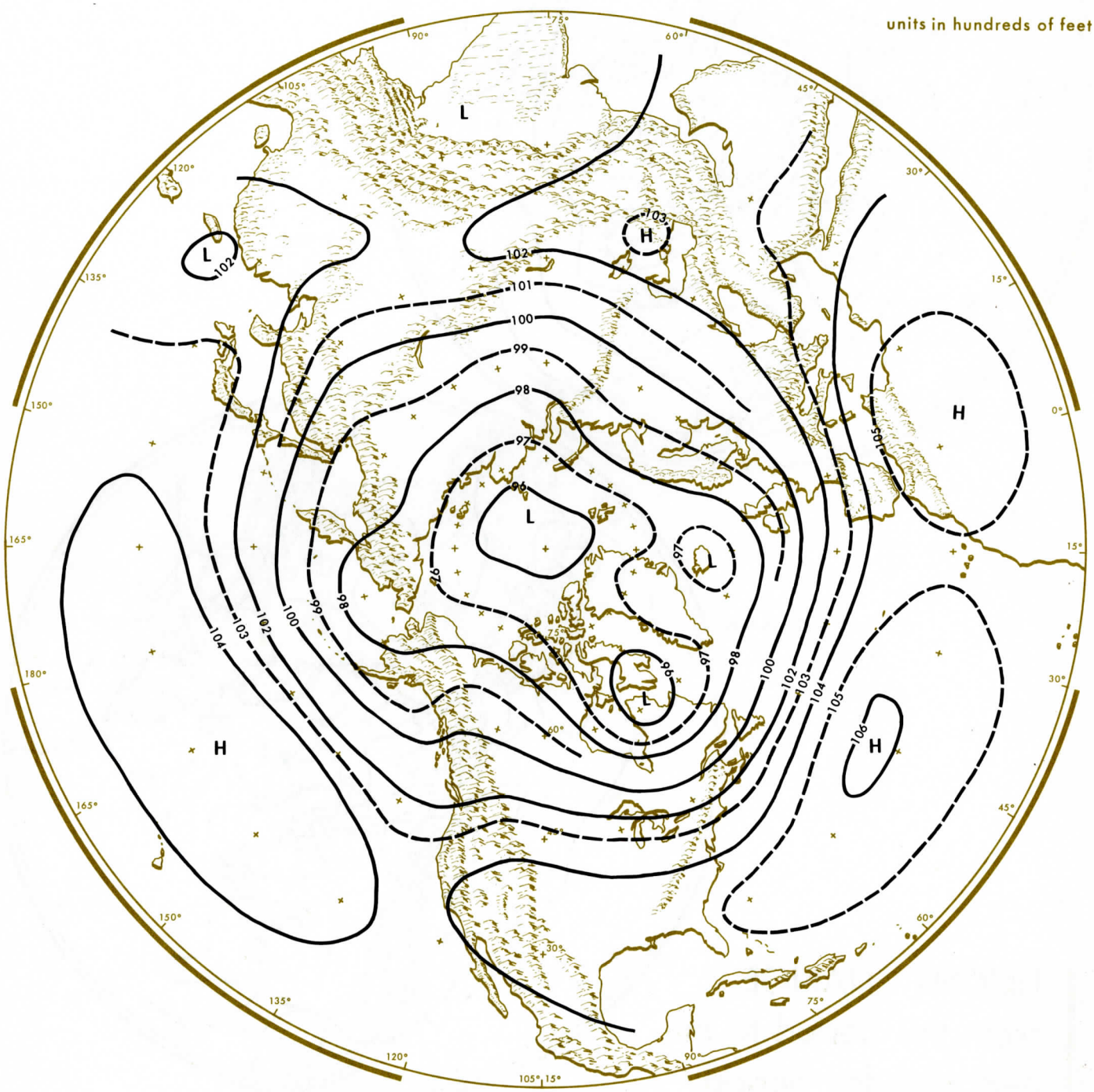
units in feet



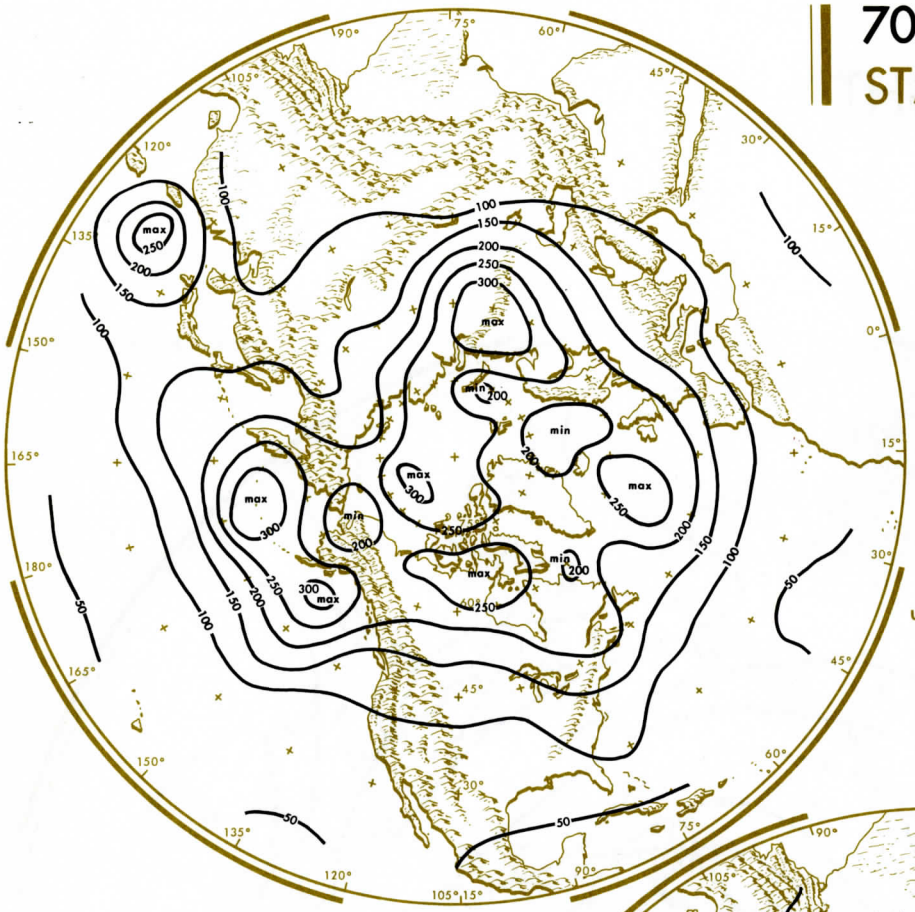
units in feet

HEIGHT CHANGE
from this period to the next five-day period

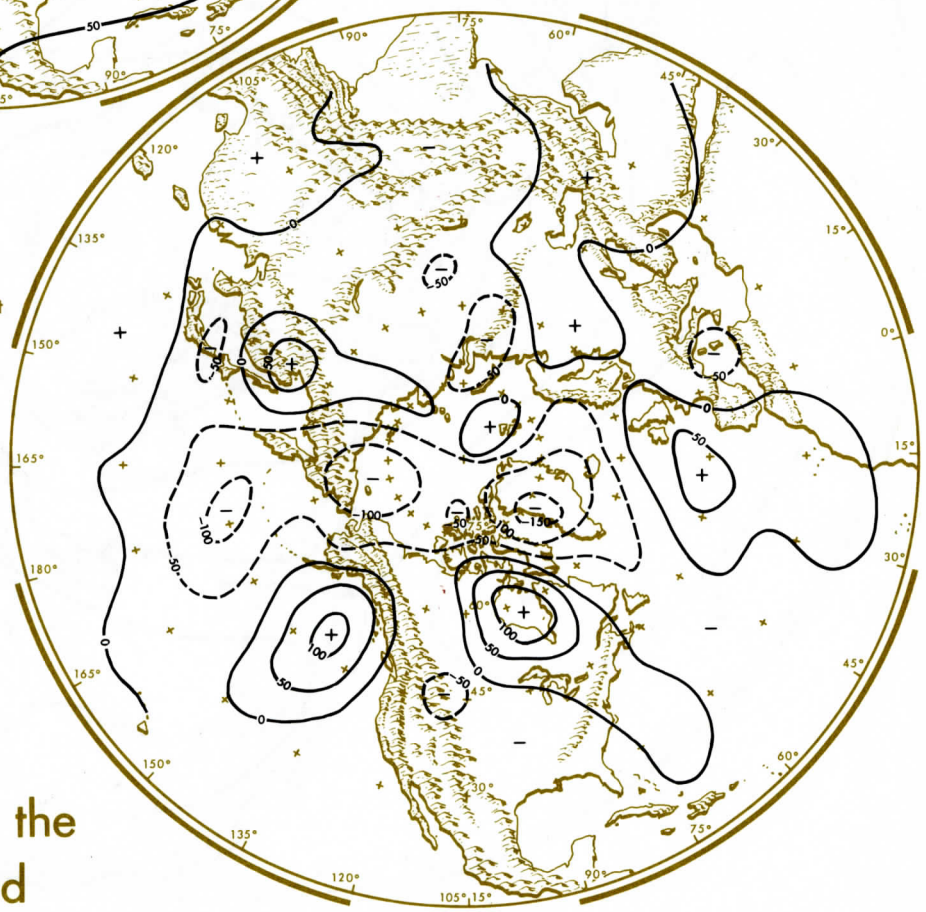
700 millibar
AVERAGE HEIGHT
August 14-18



700 millibar height
STANDARD DEVIATION



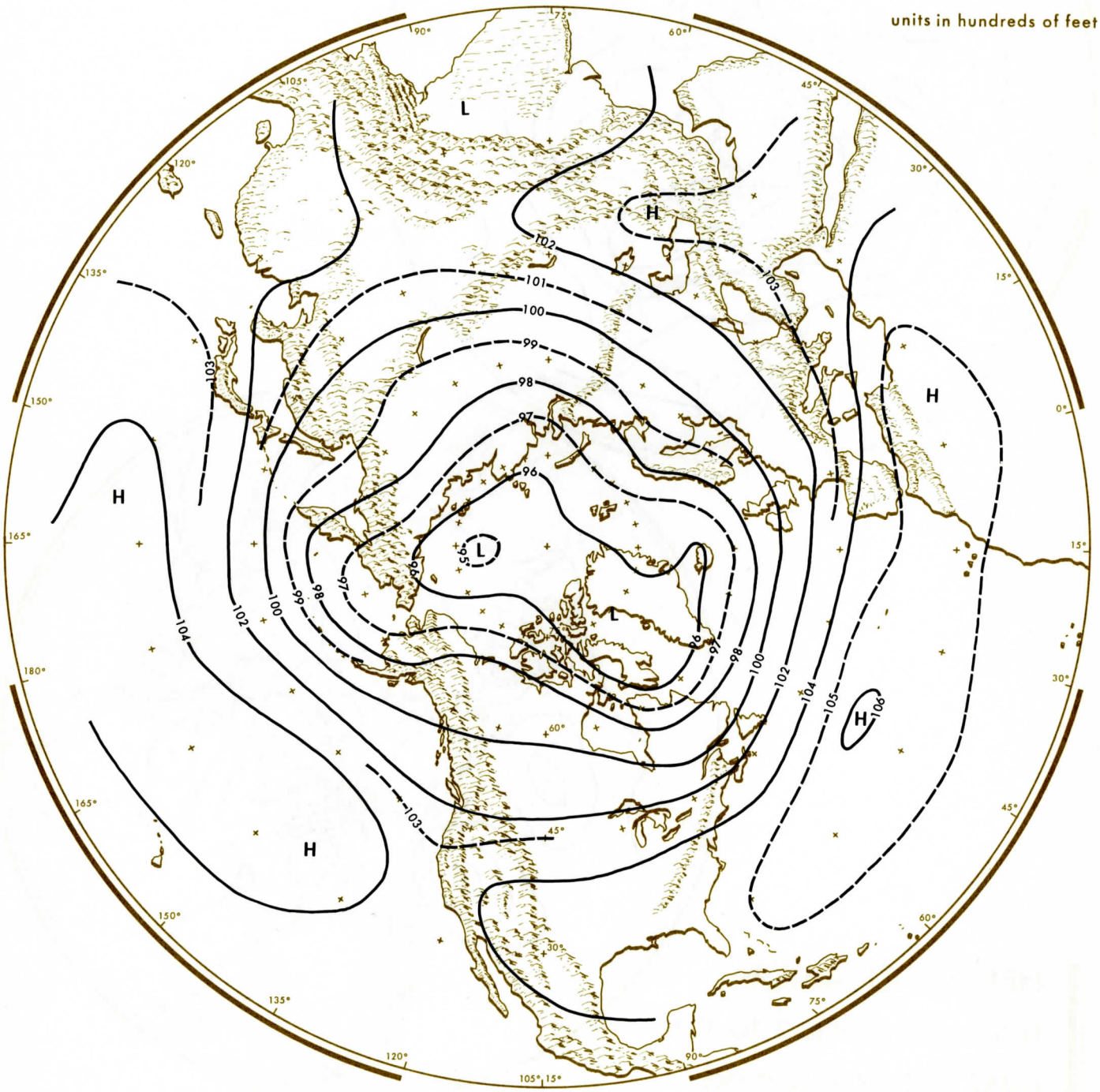
units in feet



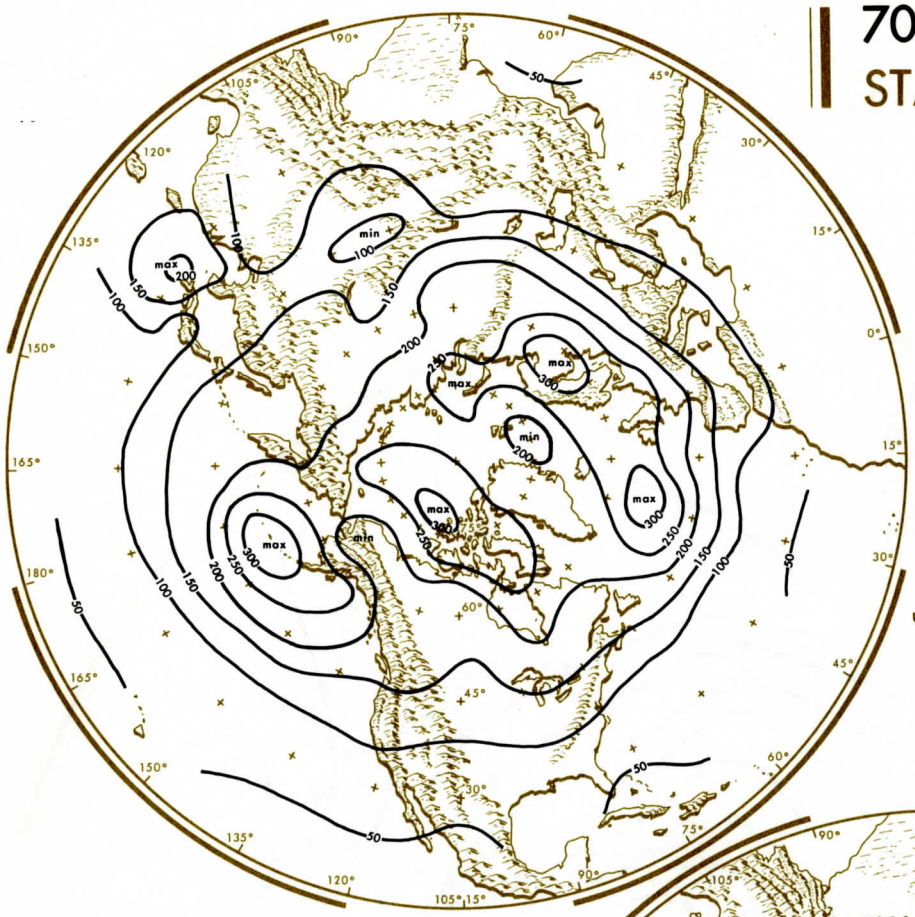
units in feet

HEIGHT CHANGE
from this period to the next five-day period

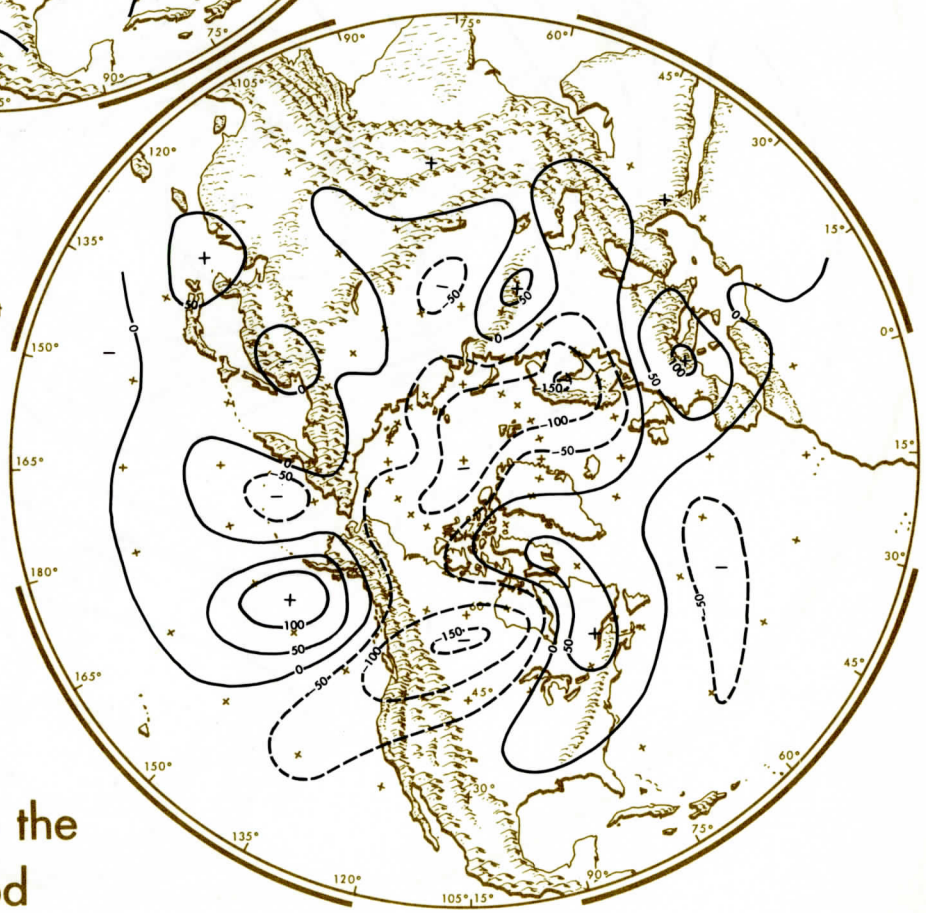
700 millibar
AVERAGE HEIGHT
August 19-23



700 millibar height
STANDARD DEVIATION



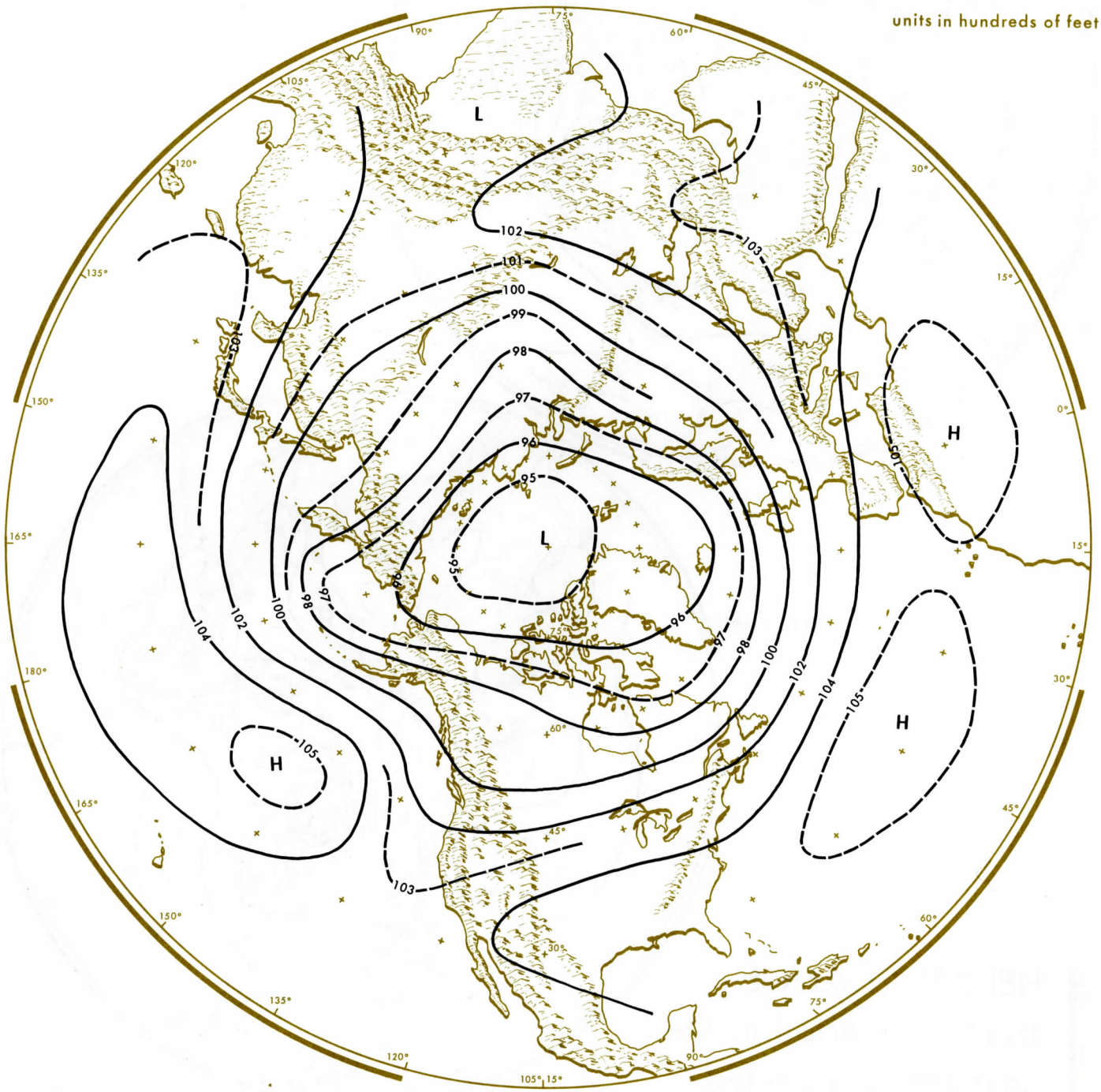
units in feet



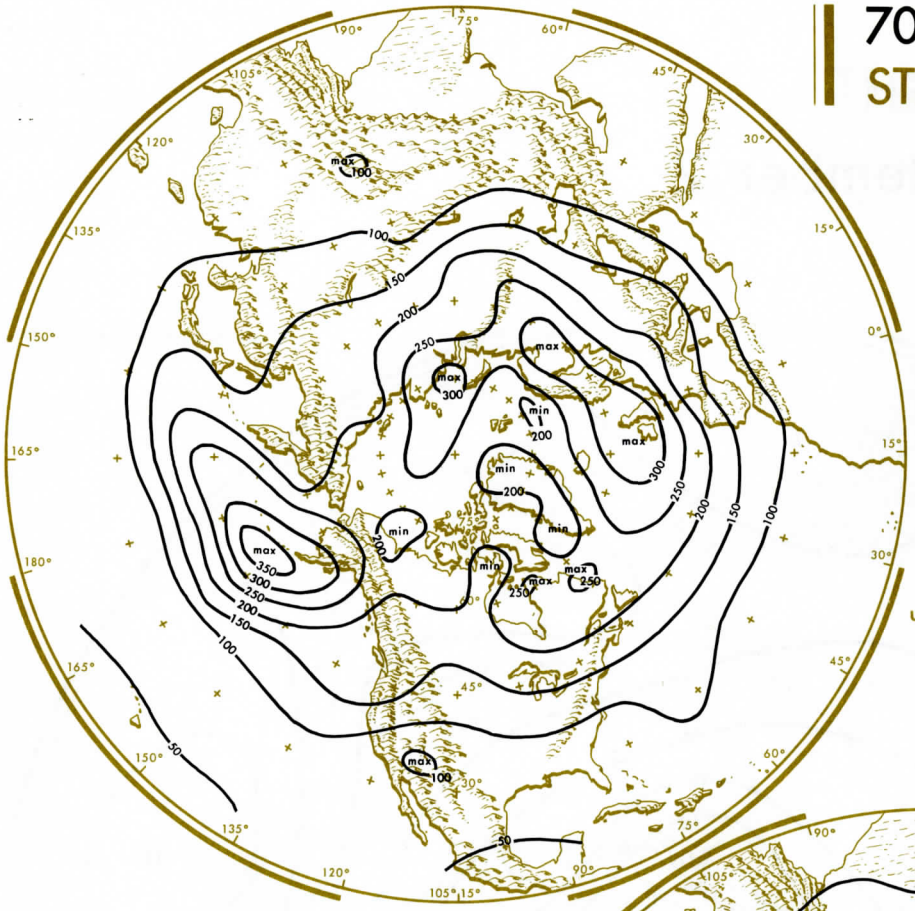
units in feet

HEIGHT CHANGE
from this period to the next five-day period

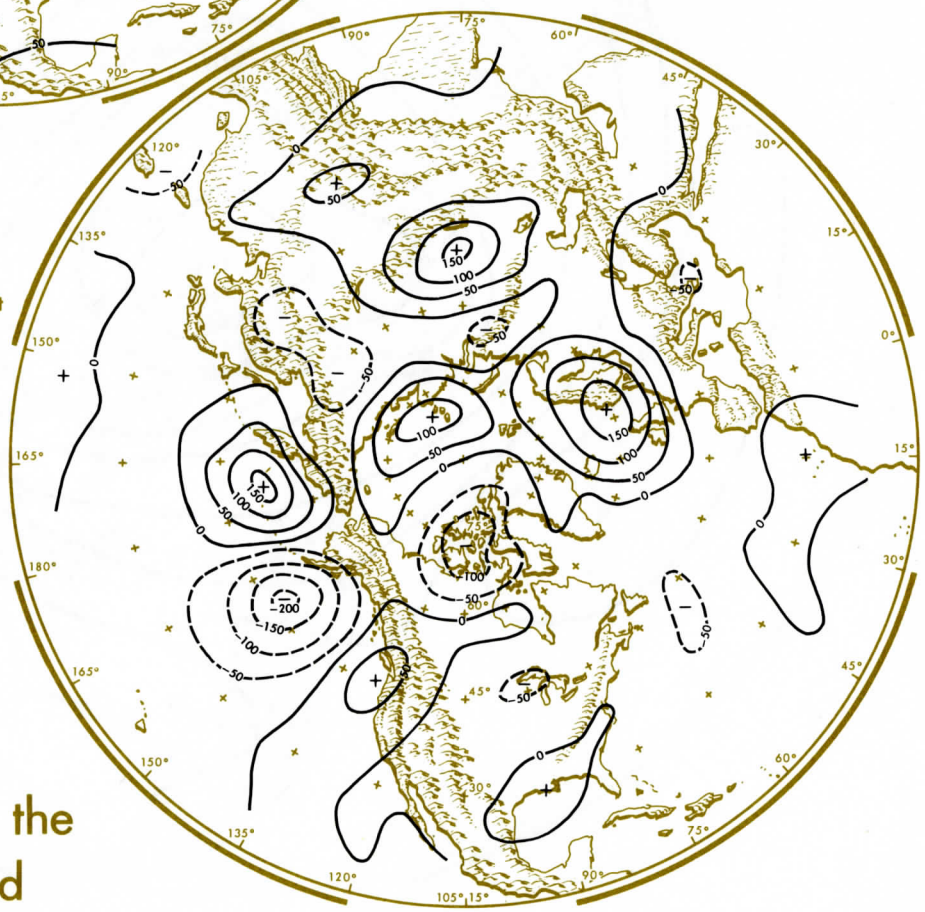
700 millibar
AVERAGE HEIGHT
August 24-28



700 millibar height
STANDARD DEVIATION



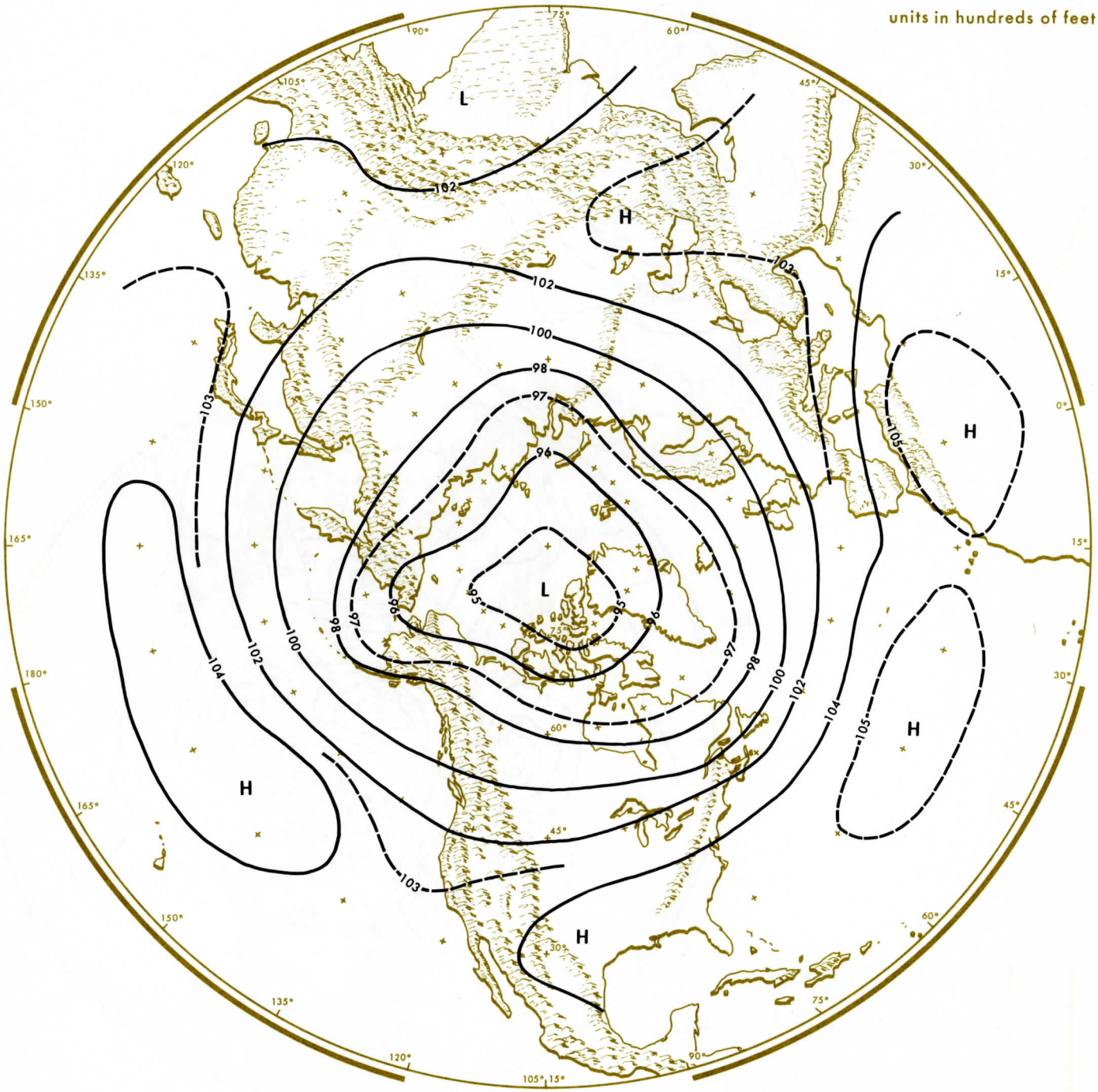
units in feet



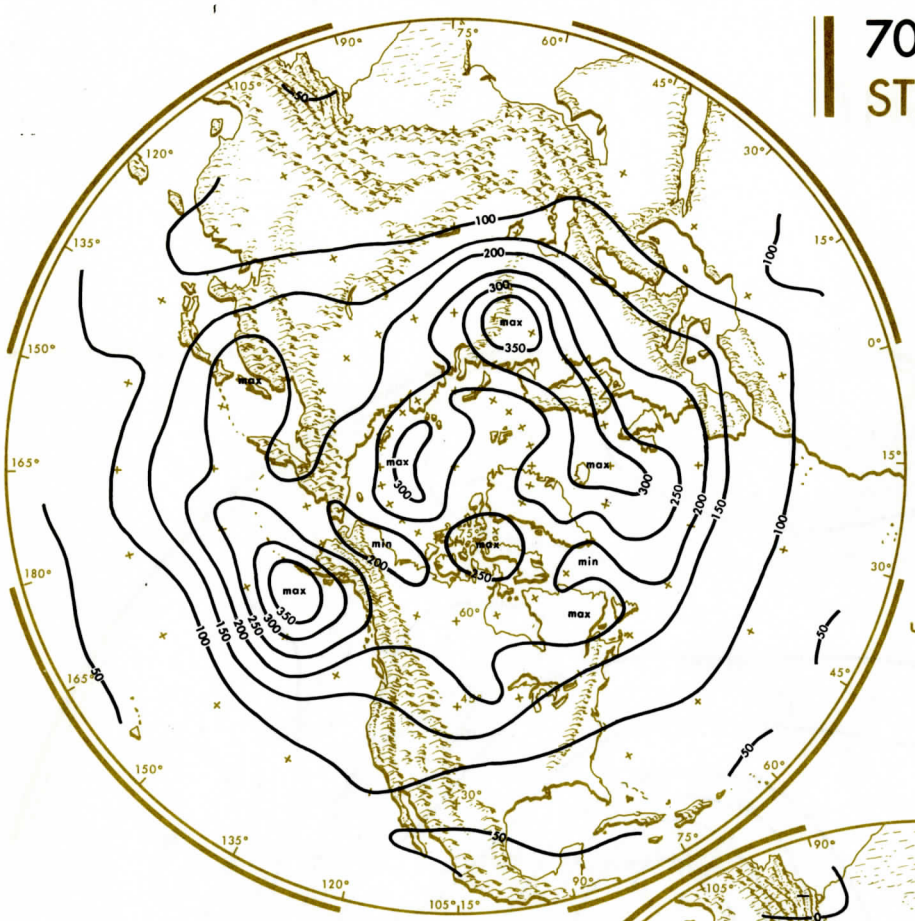
units in feet

HEIGHT CHANGE
from this period to the next five-day period

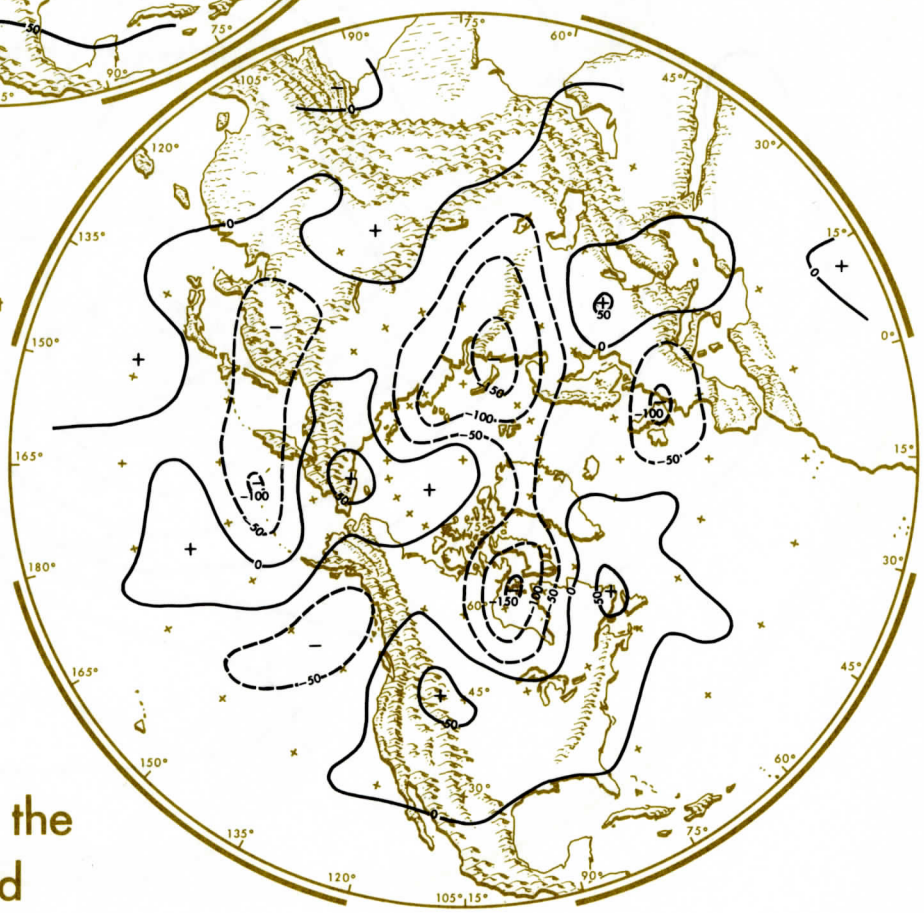
700 millibar
AVERAGE HEIGHT
August 29-September 2



700 millibar height
STANDARD DEVIATION



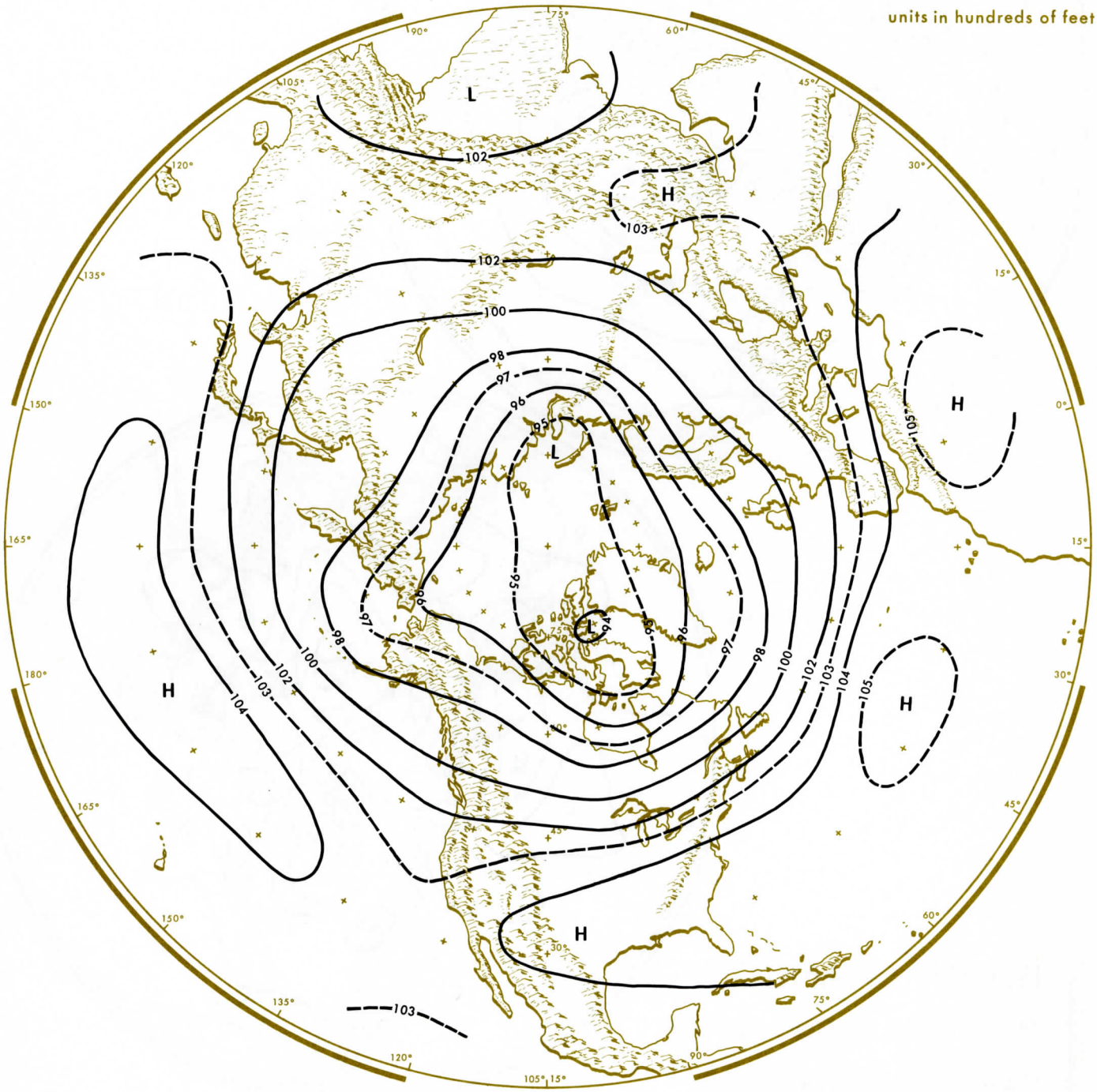
units in feet



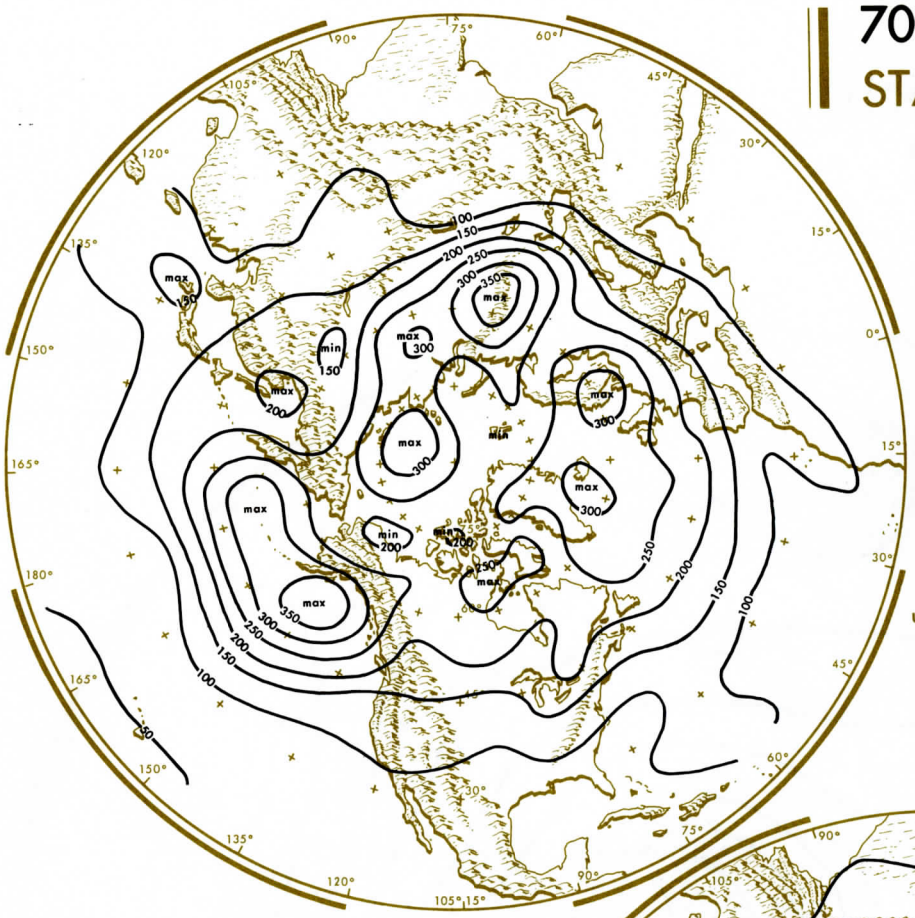
units in feet

HEIGHT CHANGE
from this period to the next five-day period

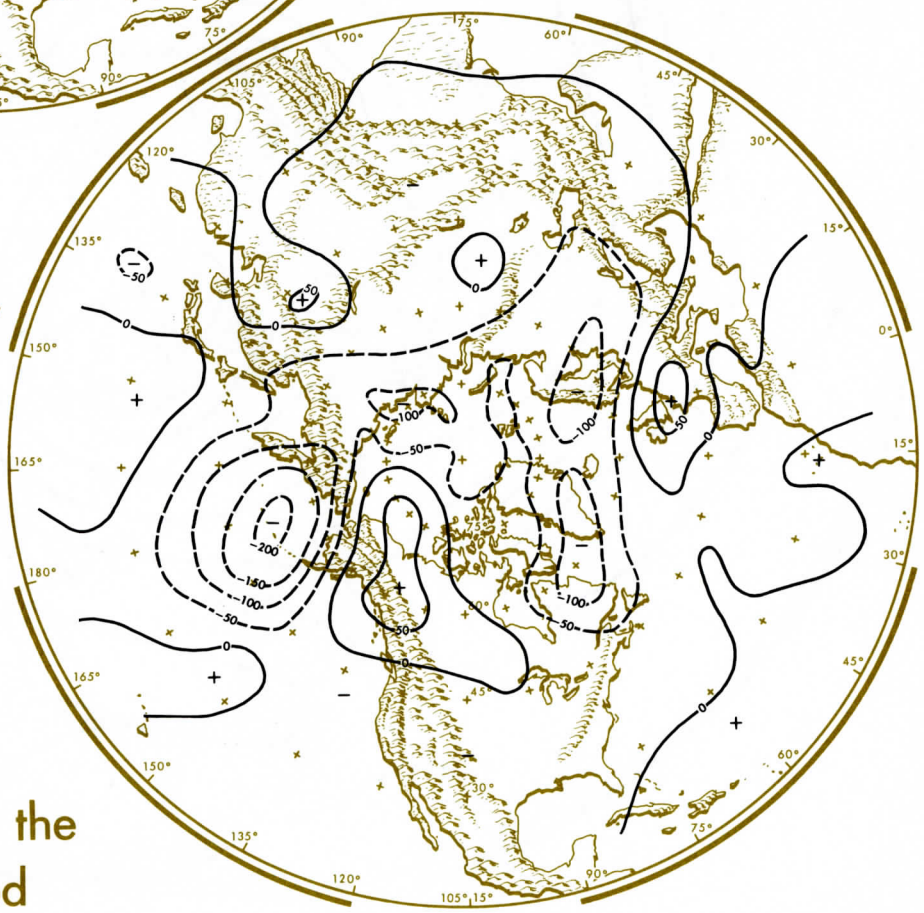
700 millibar
AVERAGE HEIGHT
September 3-7



700 millibar height
STANDARD DEVIATION



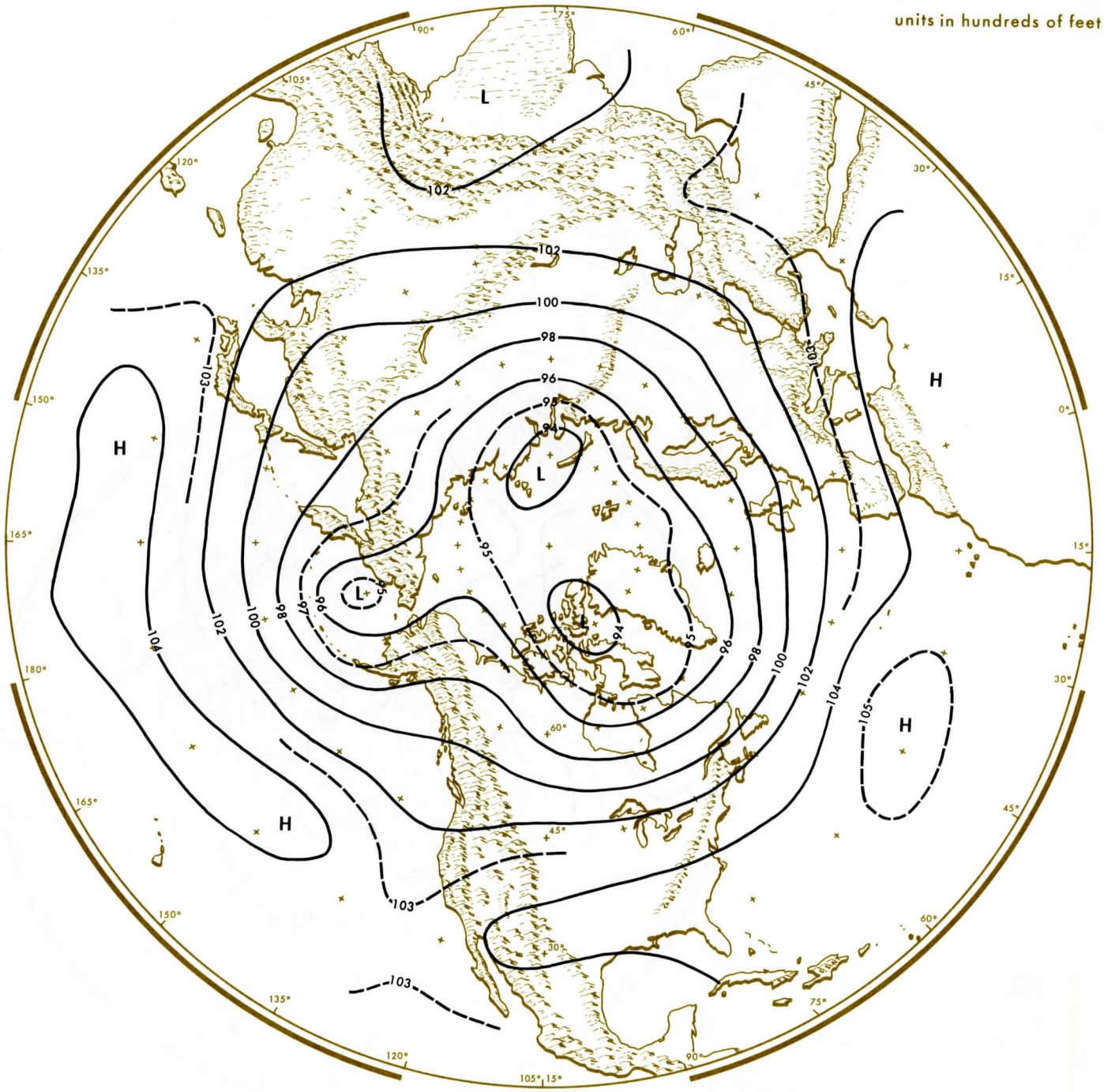
units in feet



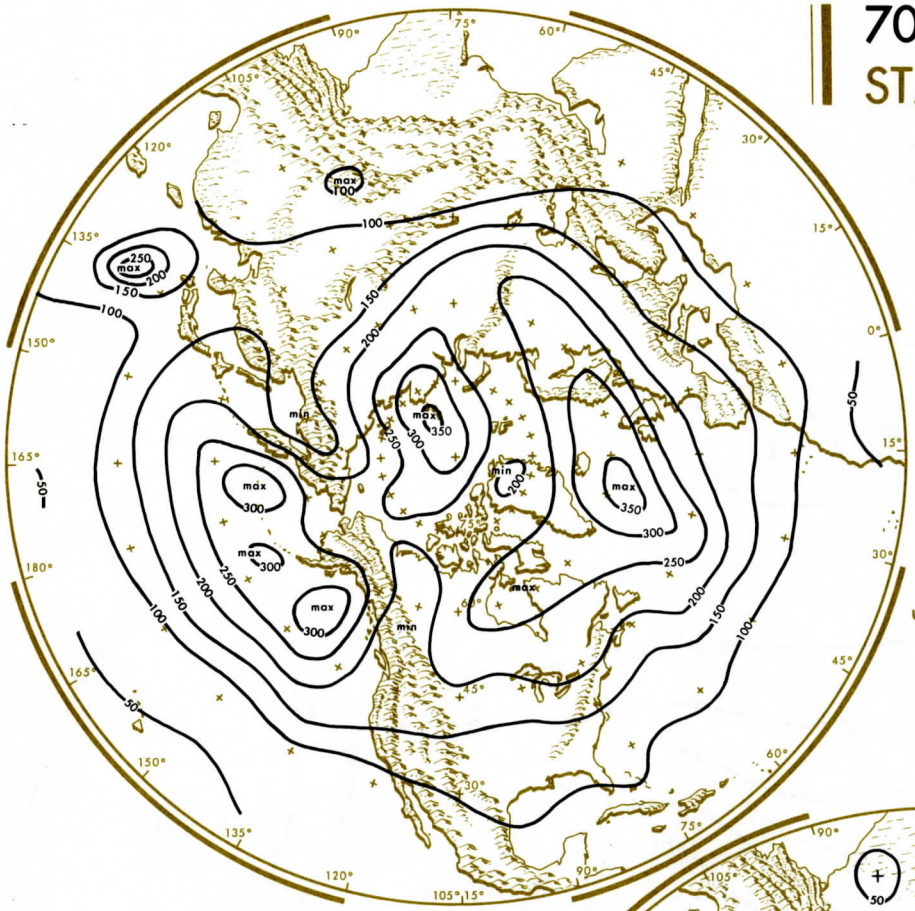
units in feet

HEIGHT CHANGE
from this period to the next five-day period

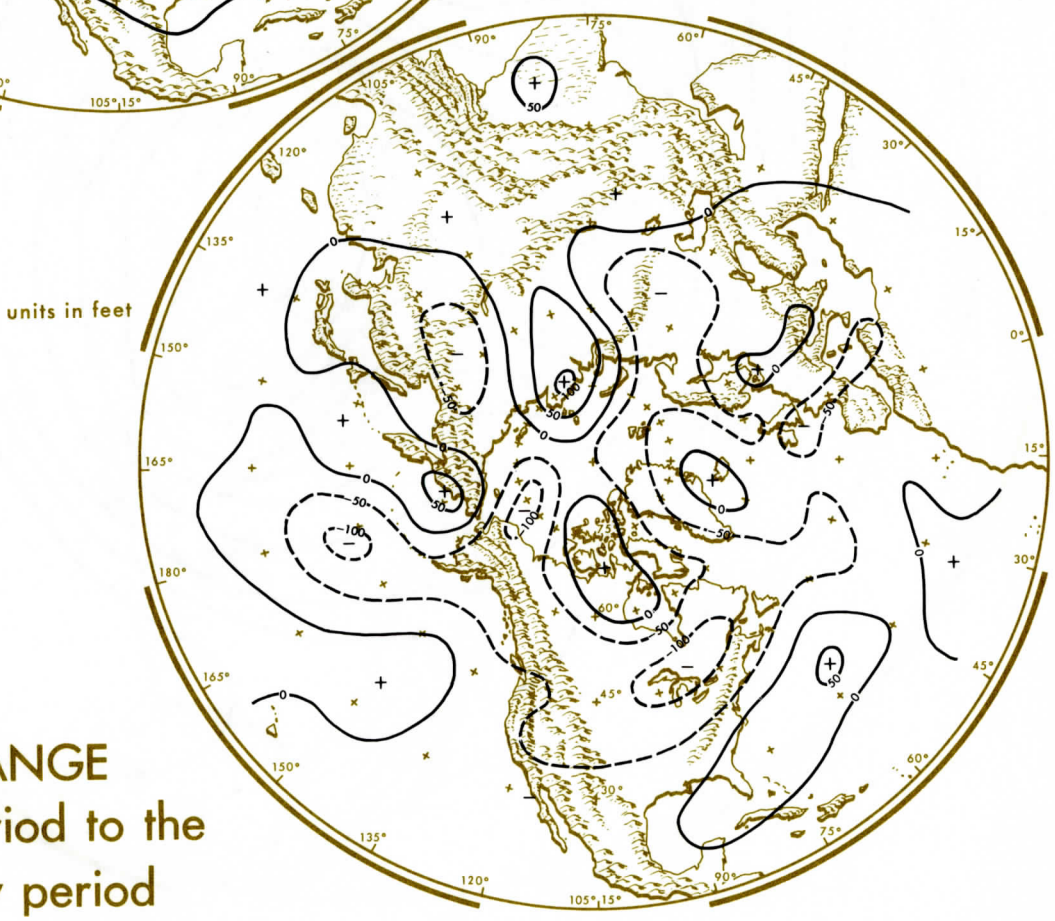
700 millibar
AVERAGE HEIGHT
September 8-12



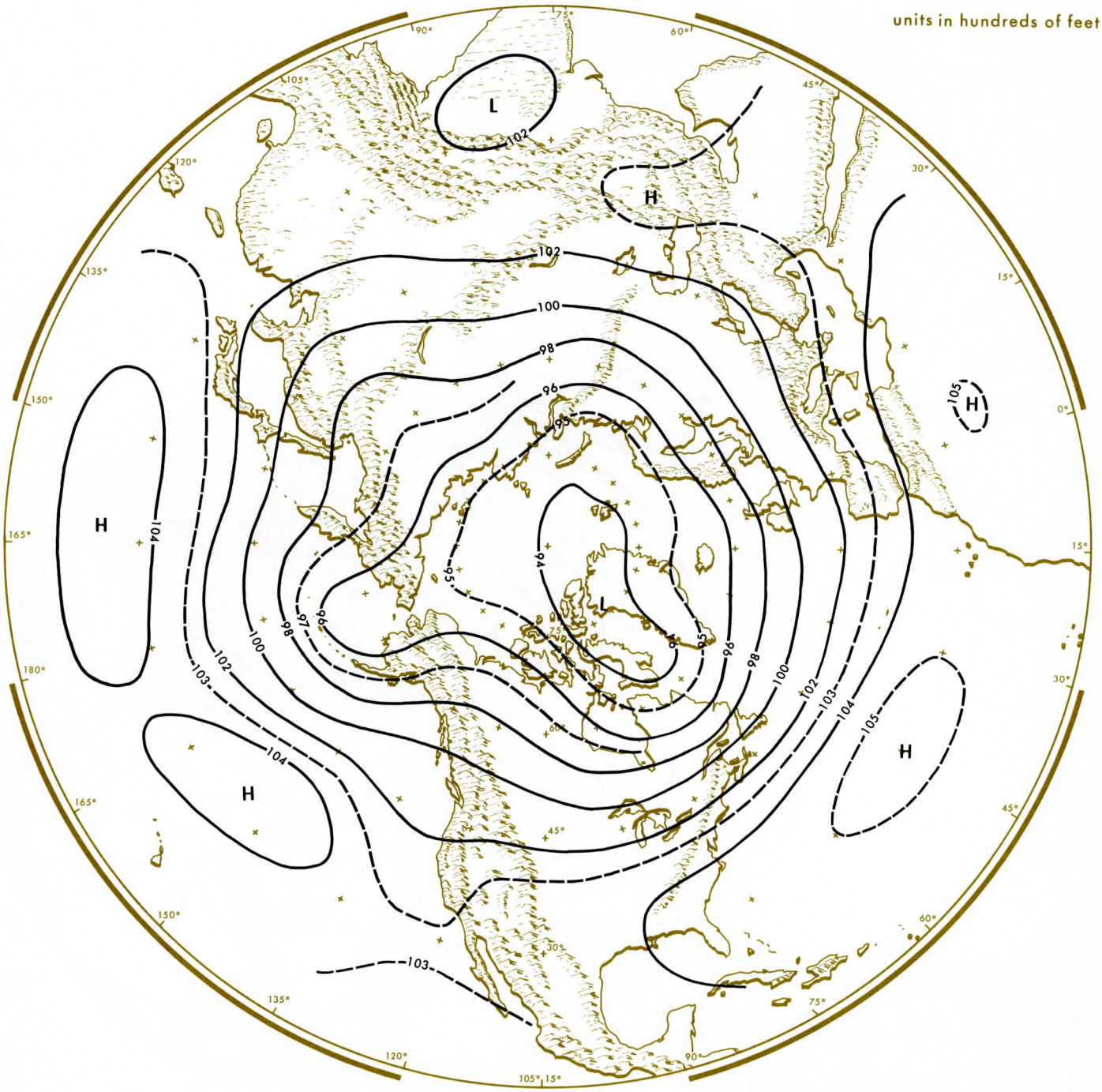
700 millibar height
STANDARD DEVIATION



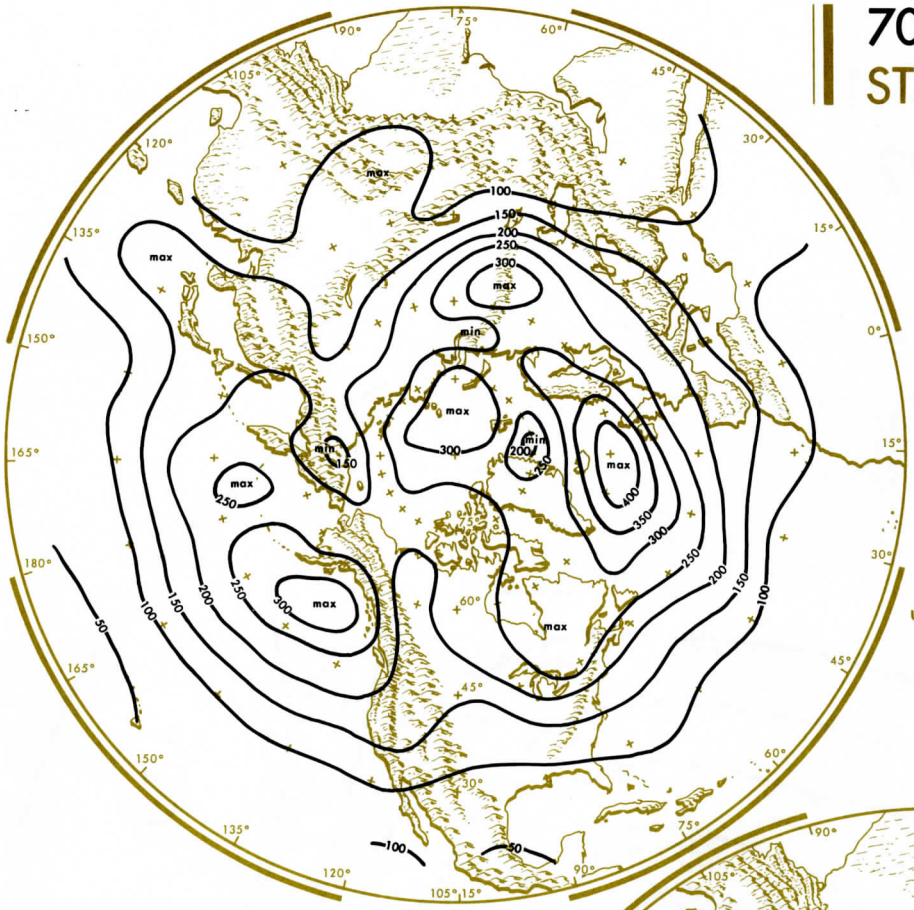
HEIGHT CHANGE
from this period to the next five-day period



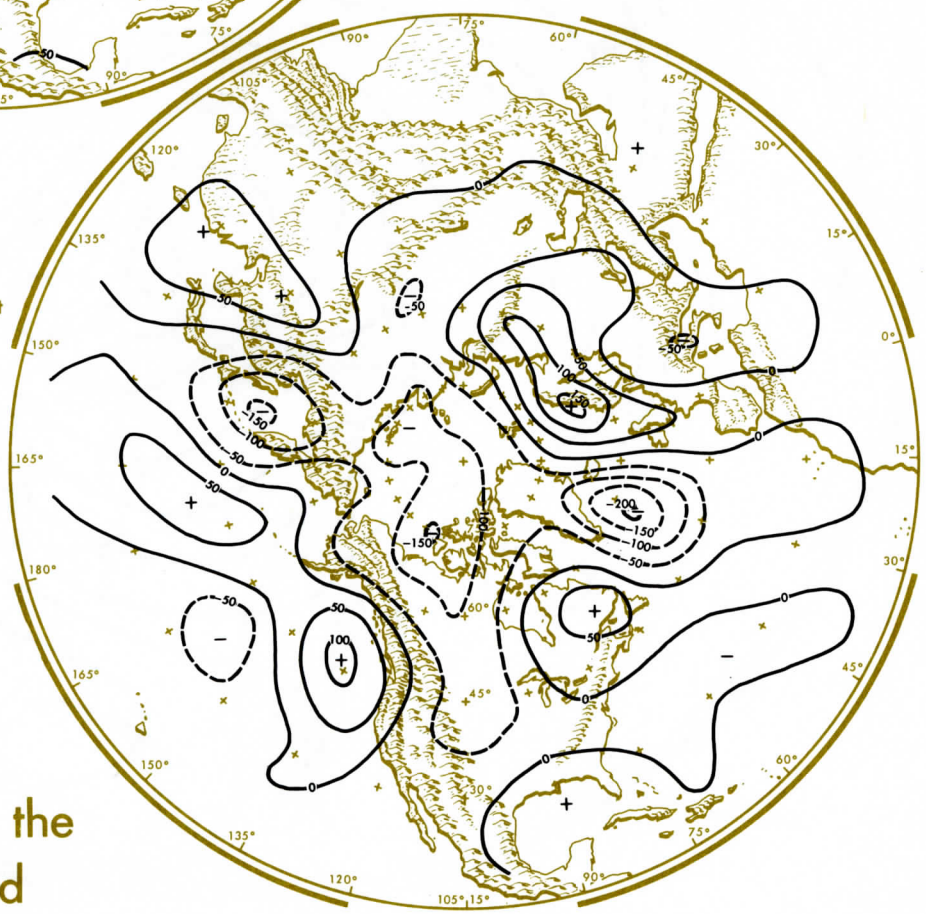
700 millibar
AVERAGE HEIGHT
September 13-17



700 millibar height
STANDARD DEVIATION



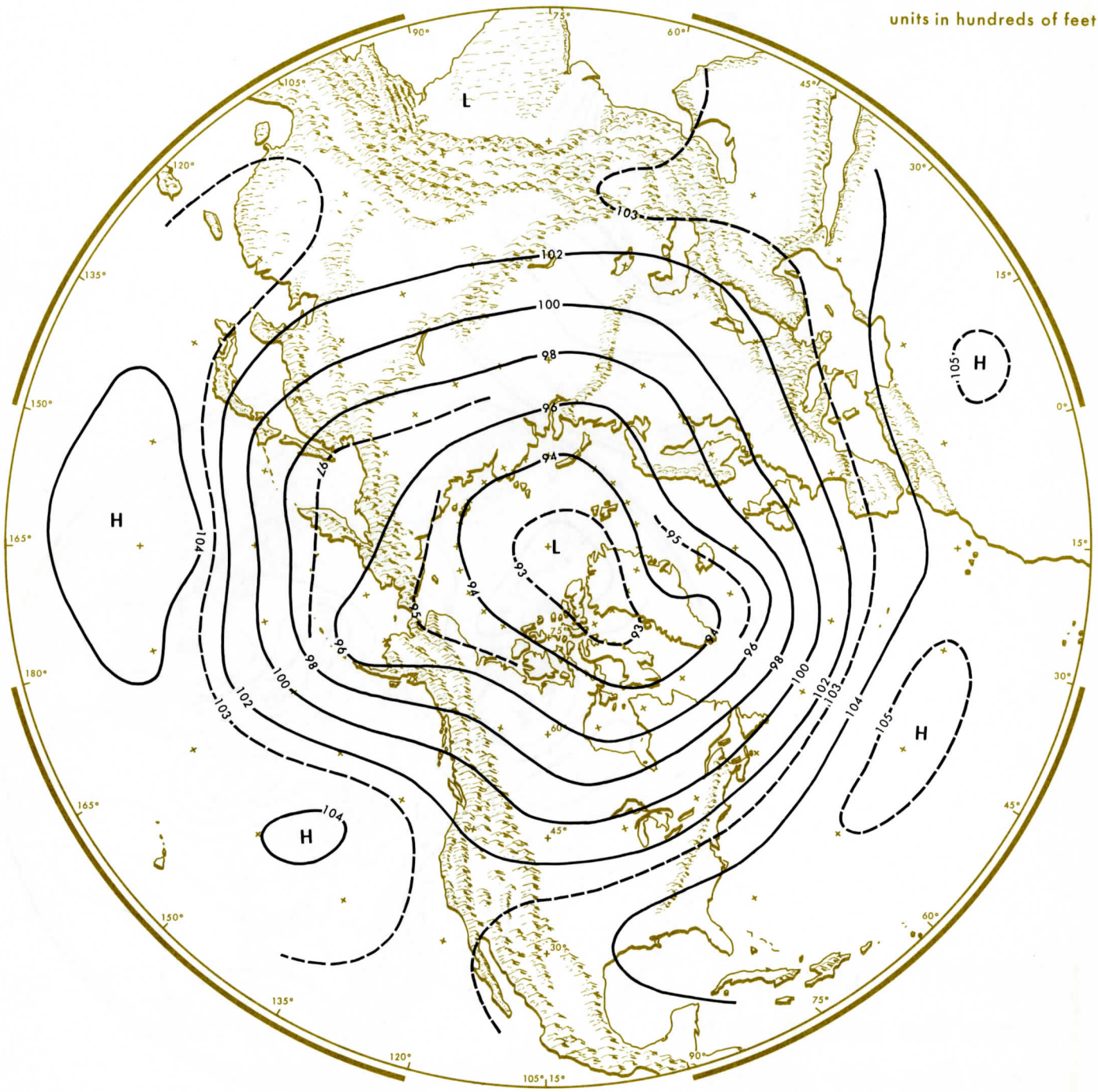
units in feet



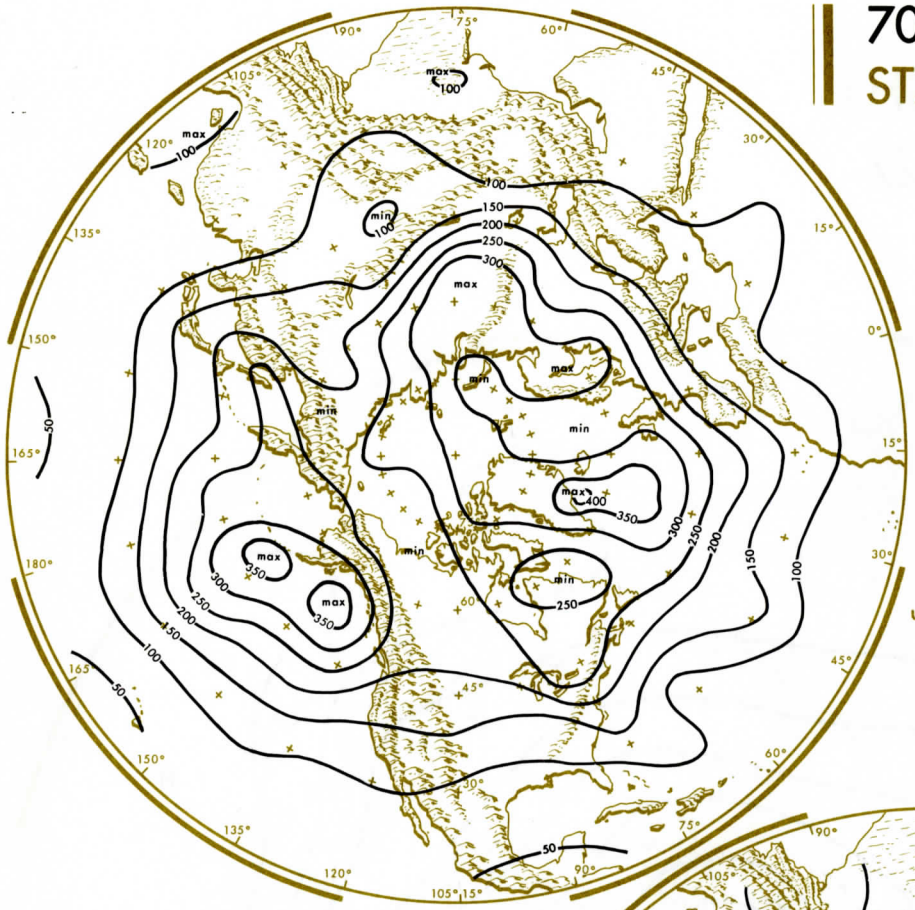
units in feet

HEIGHT CHANGE
from this period to the next five-day period

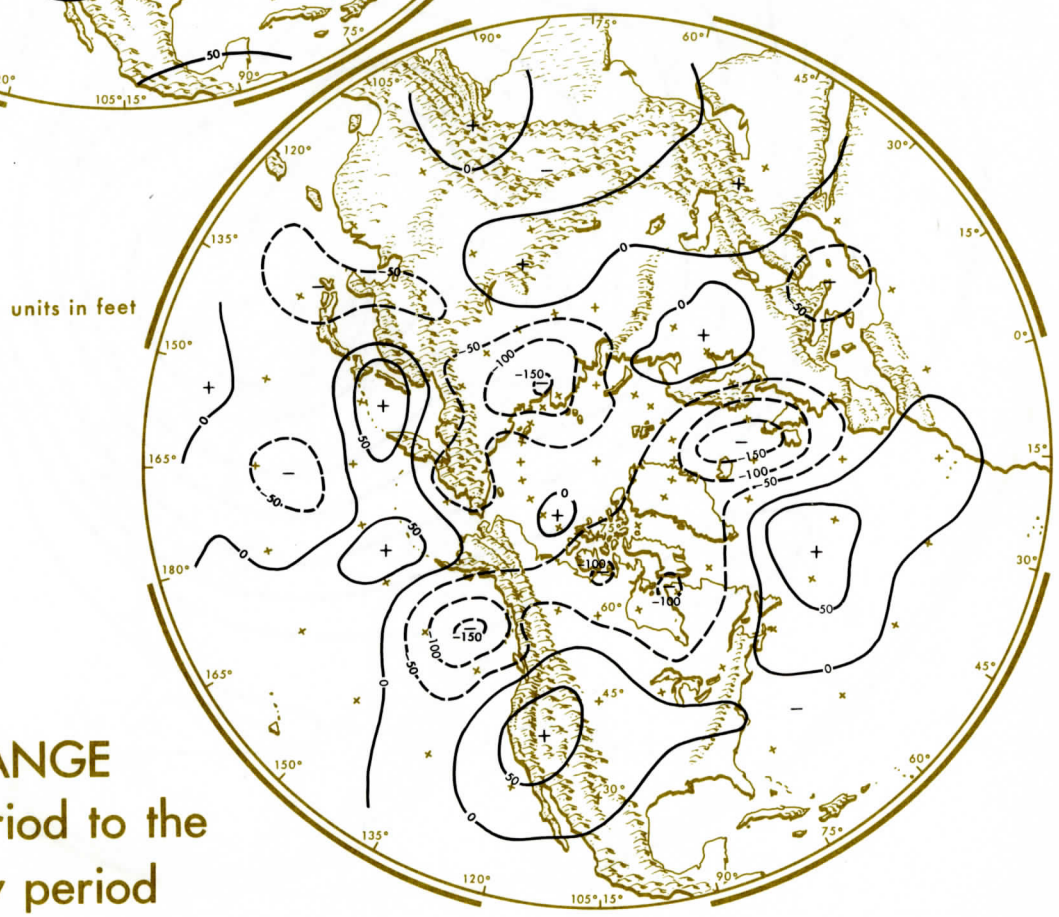
700 millibar
AVERAGE HEIGHT
September 18-22



700 millibar height
STANDARD DEVIATION



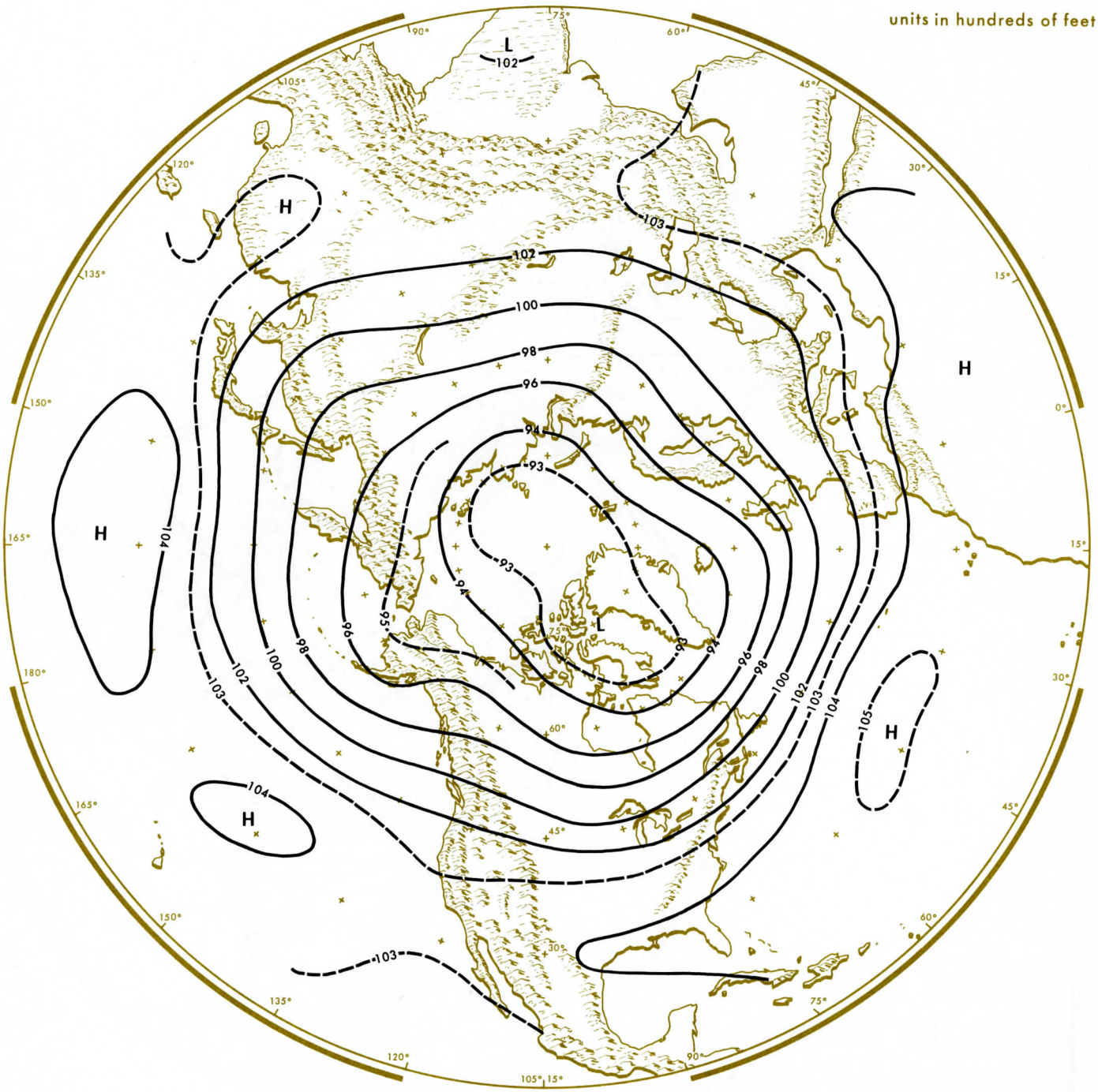
units in feet



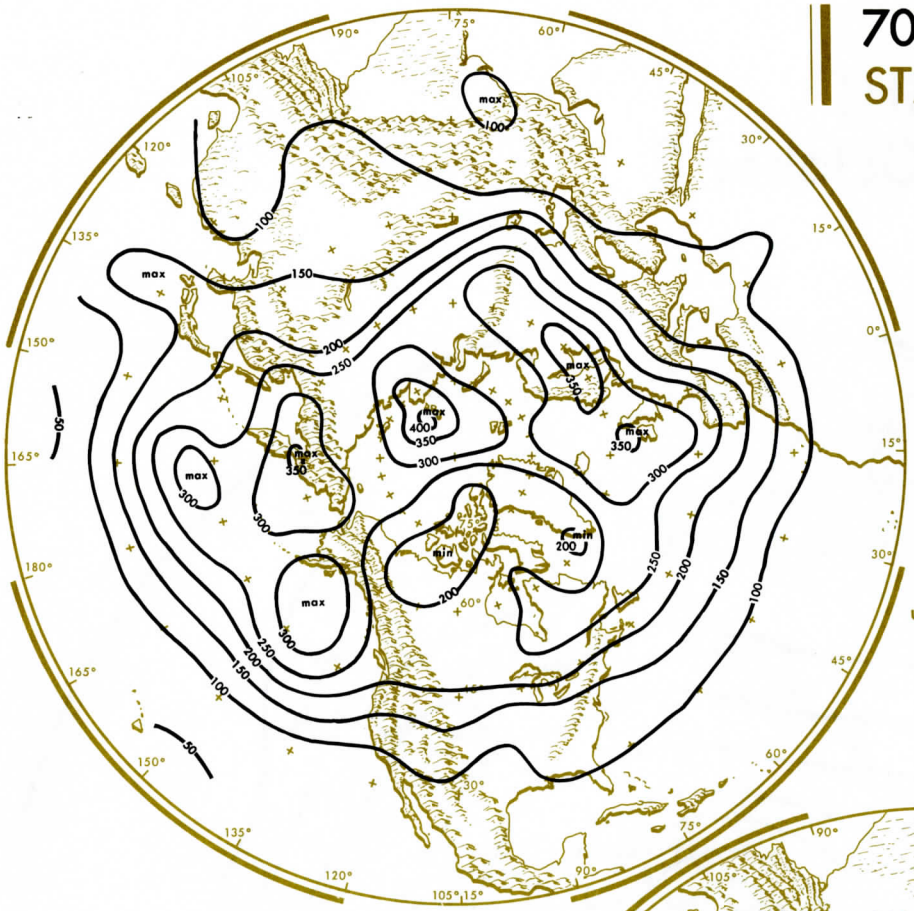
units in feet

HEIGHT CHANGE
from this period to the next five-day period

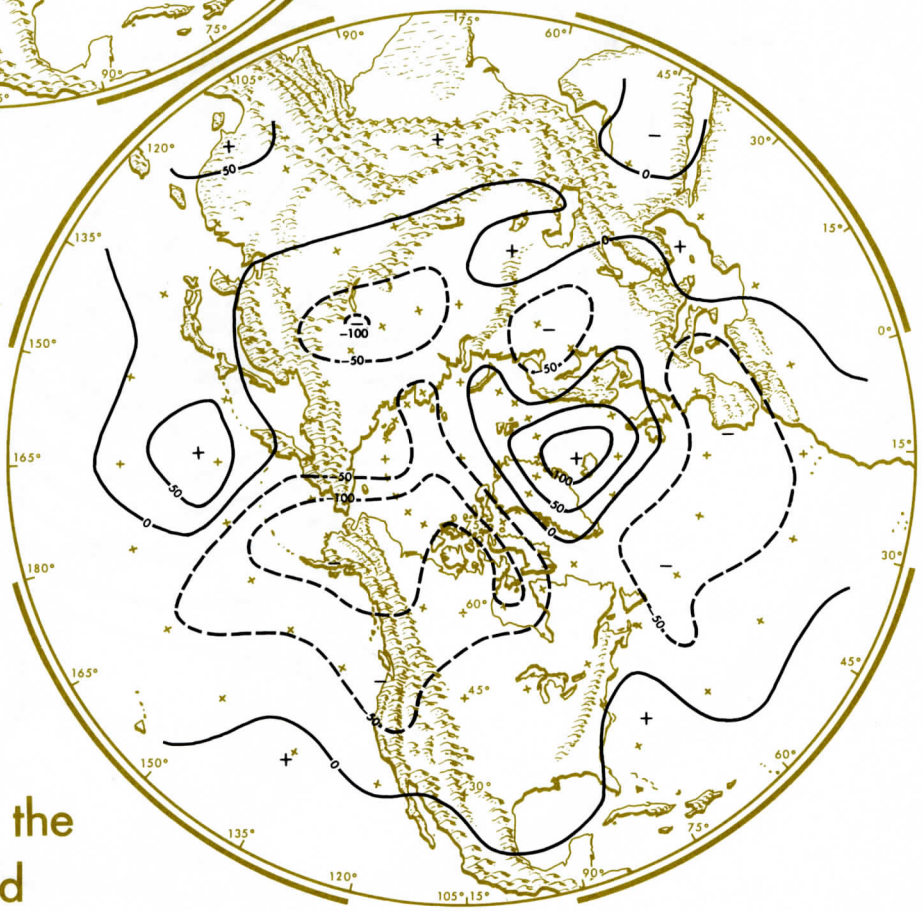
700 millibar
AVERAGE HEIGHT
September 23-27



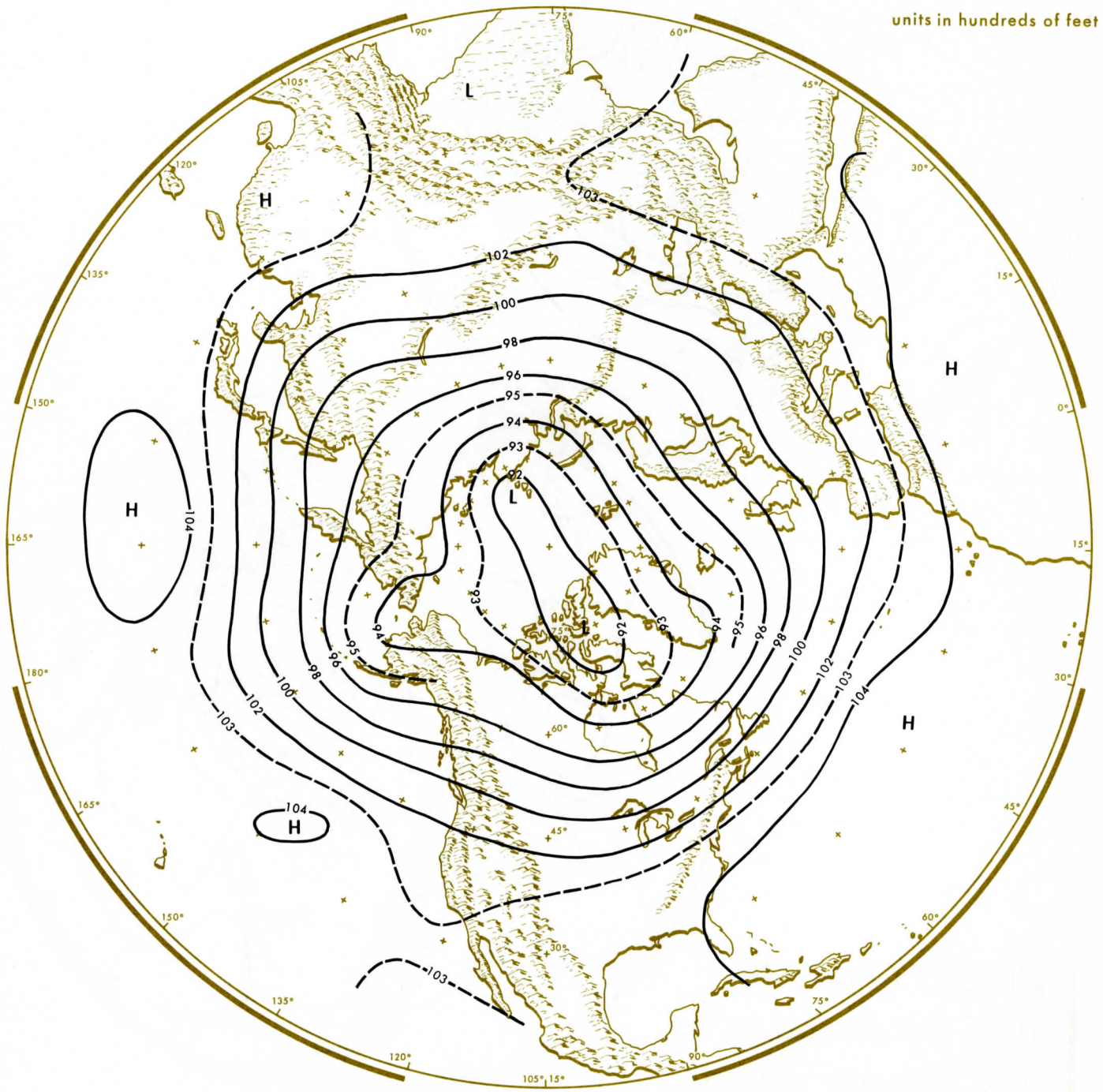
700 millibar height
STANDARD DEVIATION



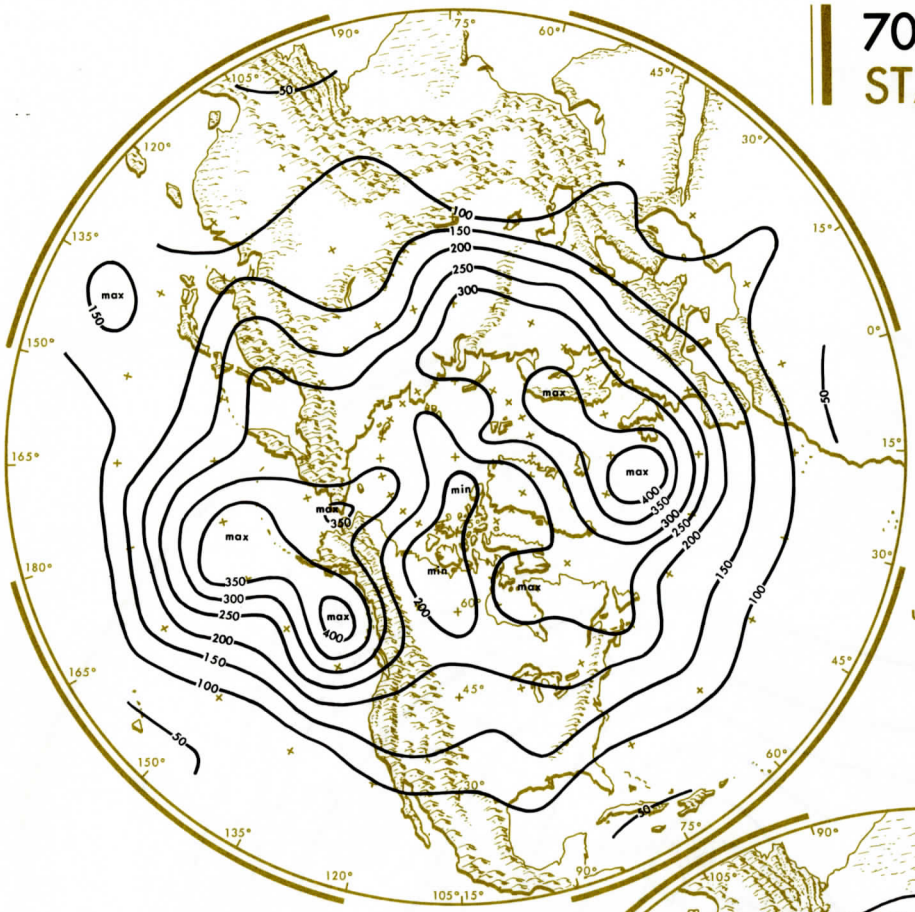
HEIGHT CHANGE
from this period to the next five-day period



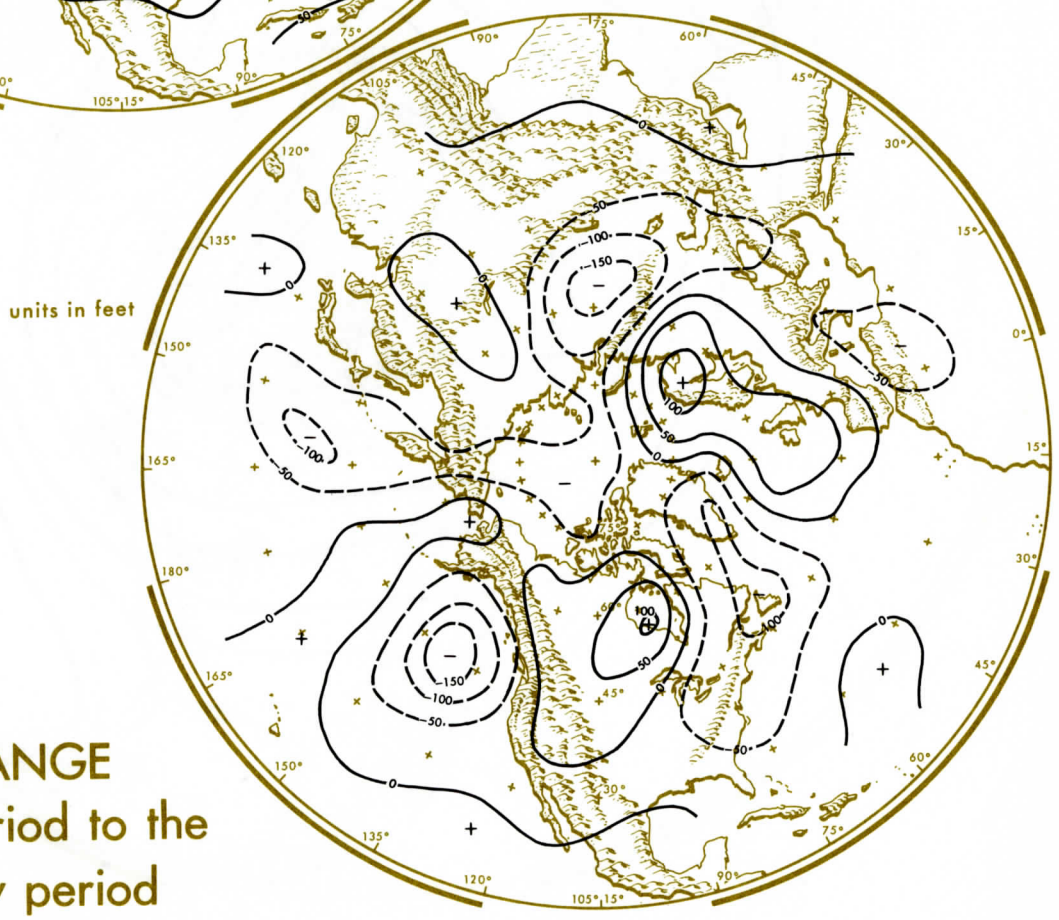
700 millibar
AVERAGE HEIGHT
September 28-October 2



700 millibar height
STANDARD DEVIATION



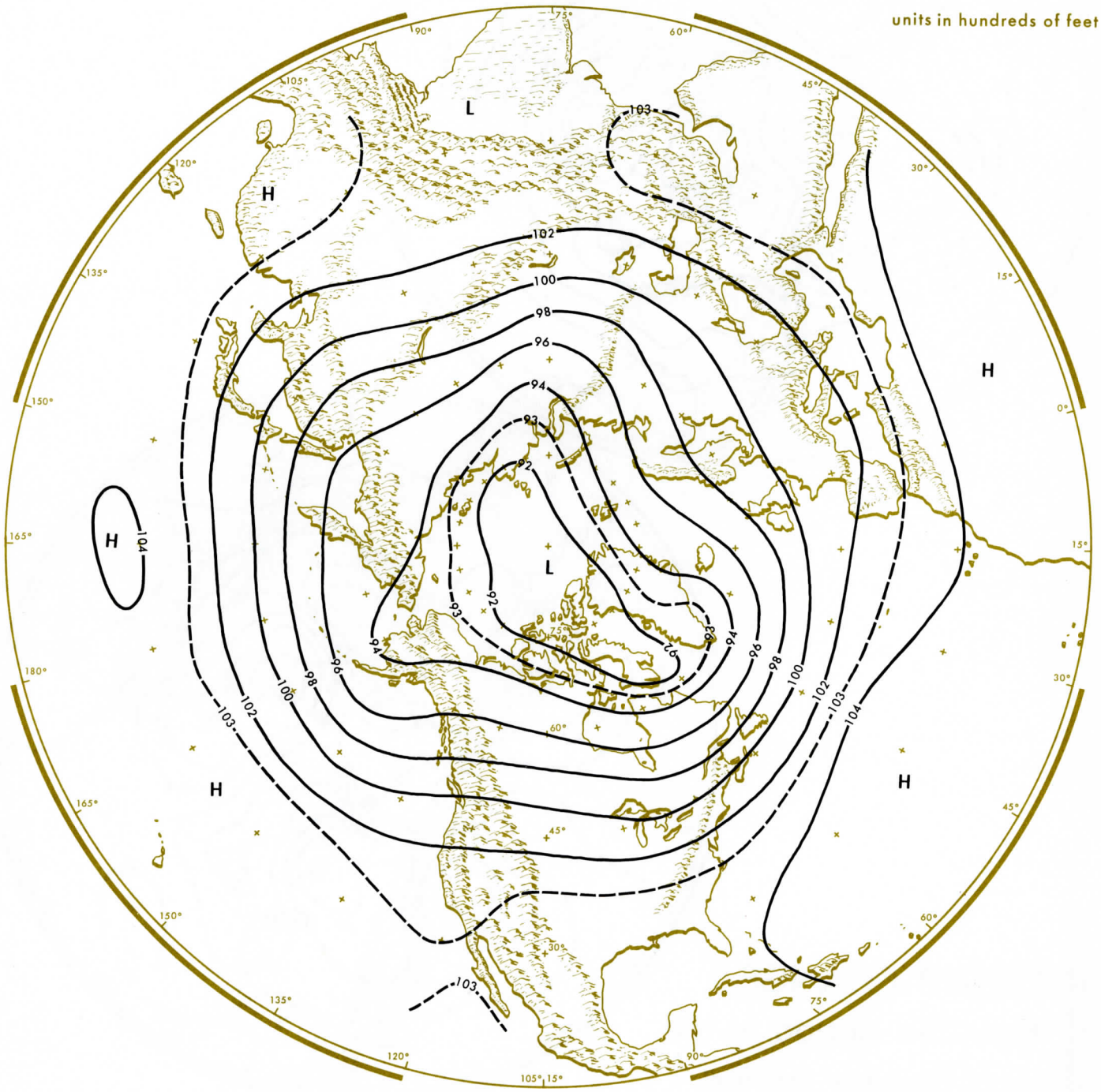
units in feet



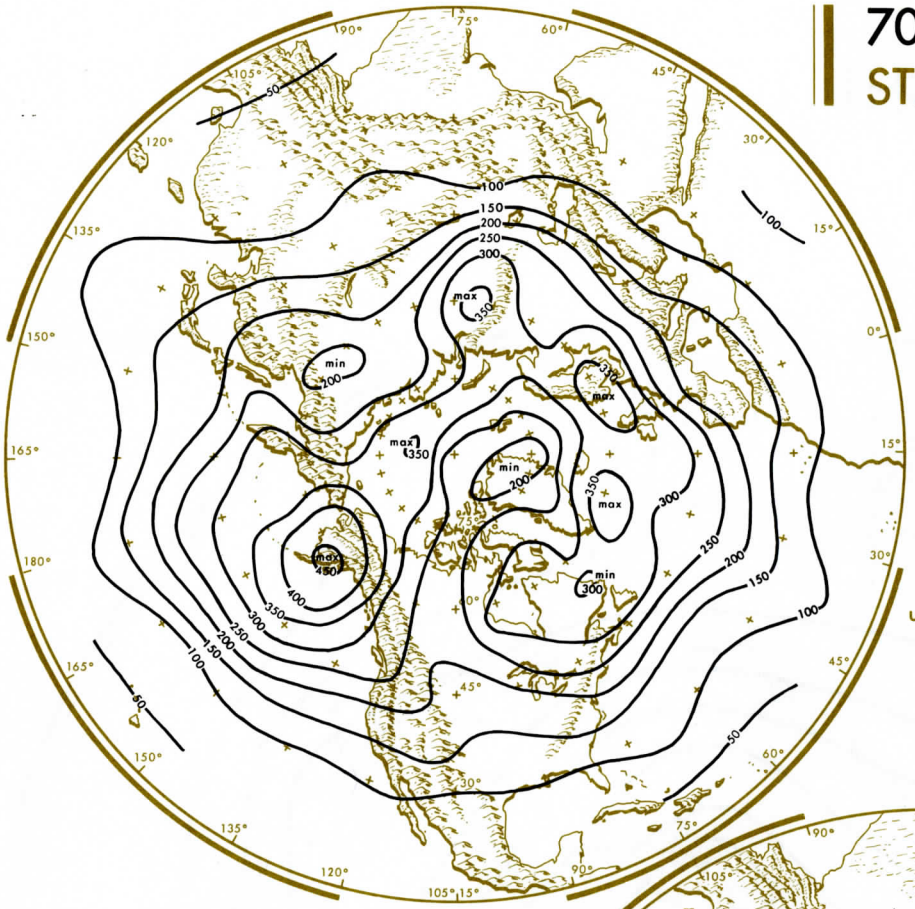
units in feet

HEIGHT CHANGE
from this period to the next five-day period

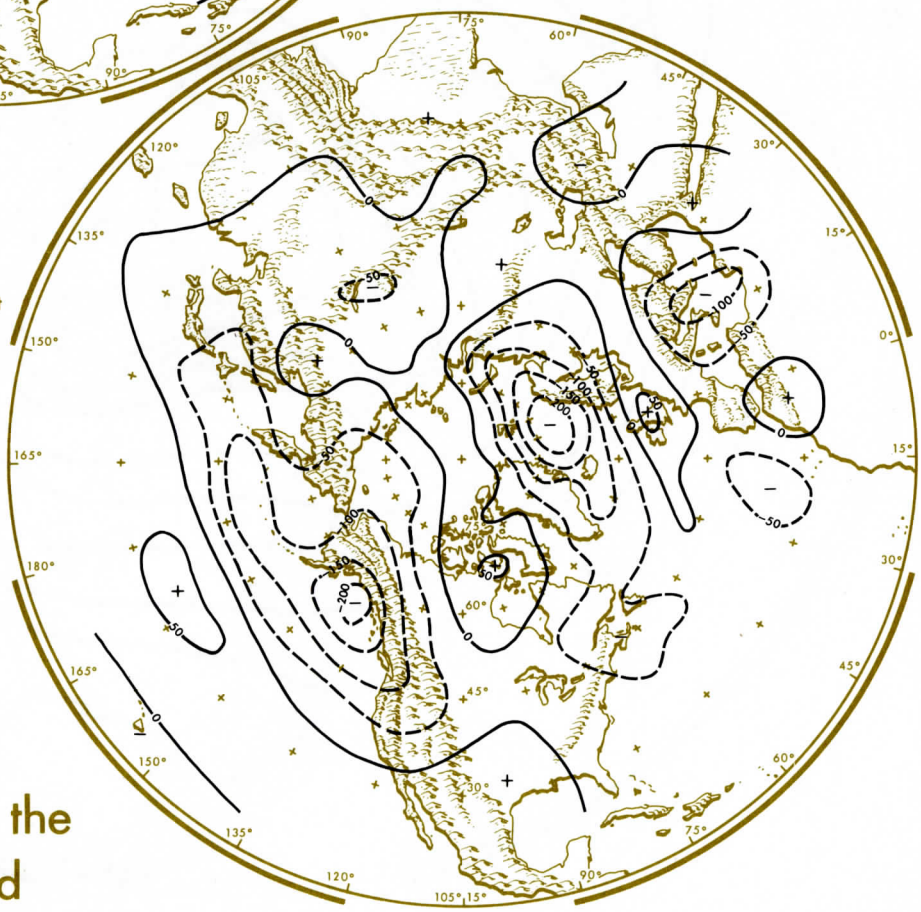
700 millibar
AVERAGE HEIGHT
October 3-7



700 millibar height
STANDARD DEVIATION



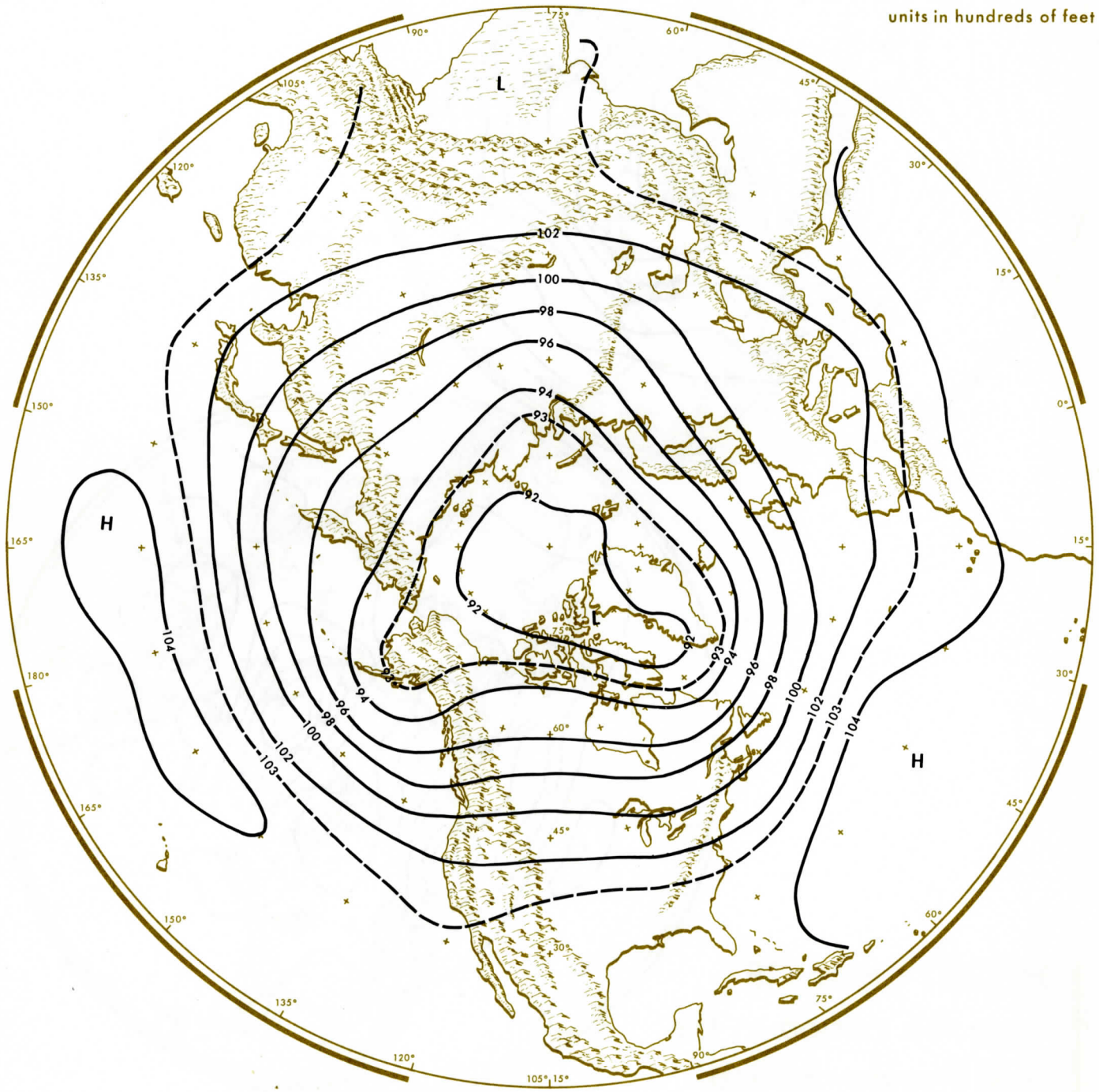
units in feet



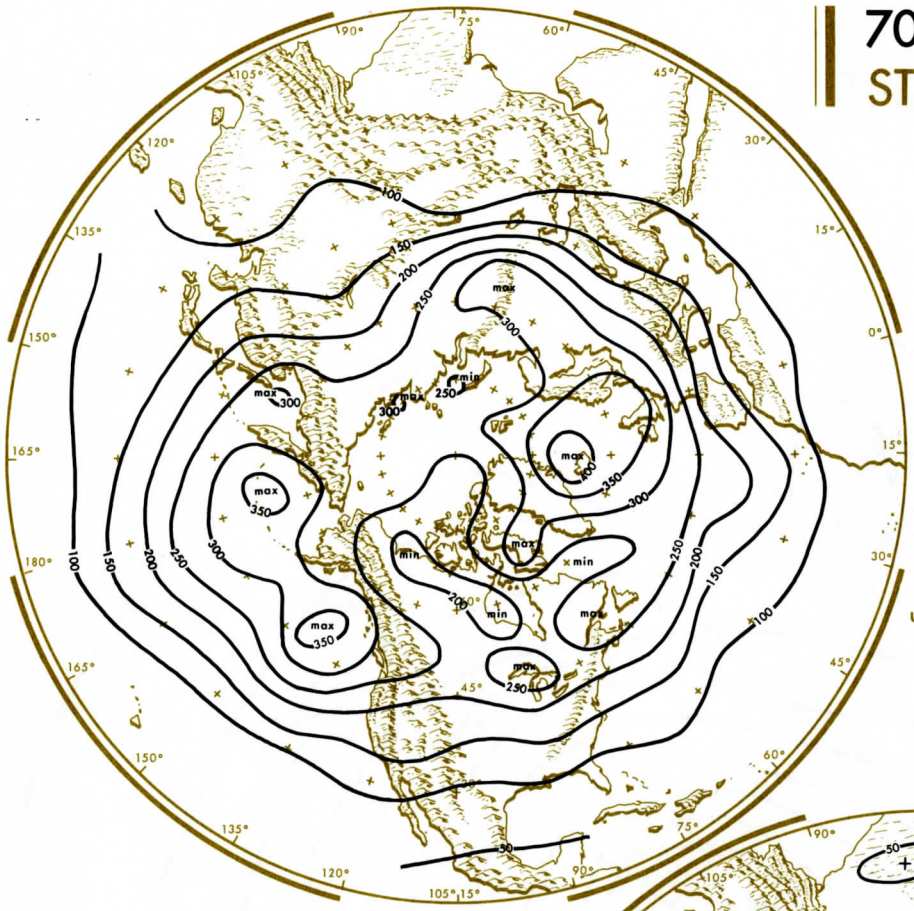
units in feet

HEIGHT CHANGE
from this period to the next five-day period

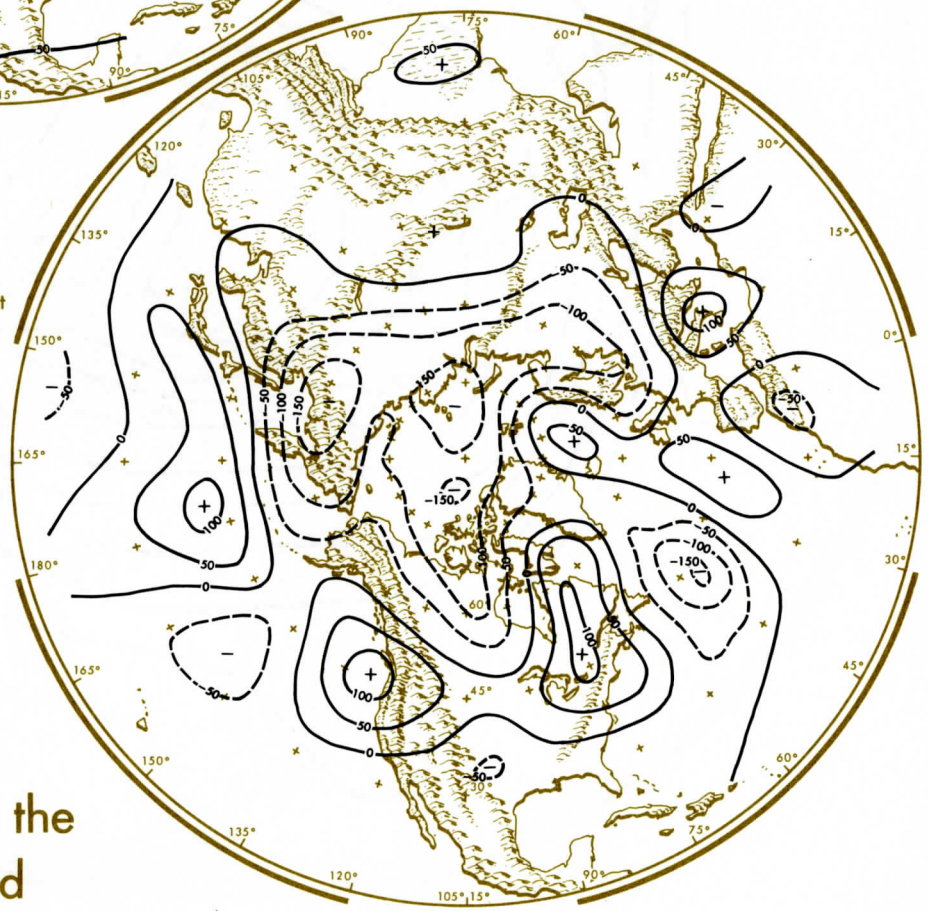
700 millibar
AVERAGE HEIGHT
October 8-12



700 millibar height
STANDARD DEVIATION



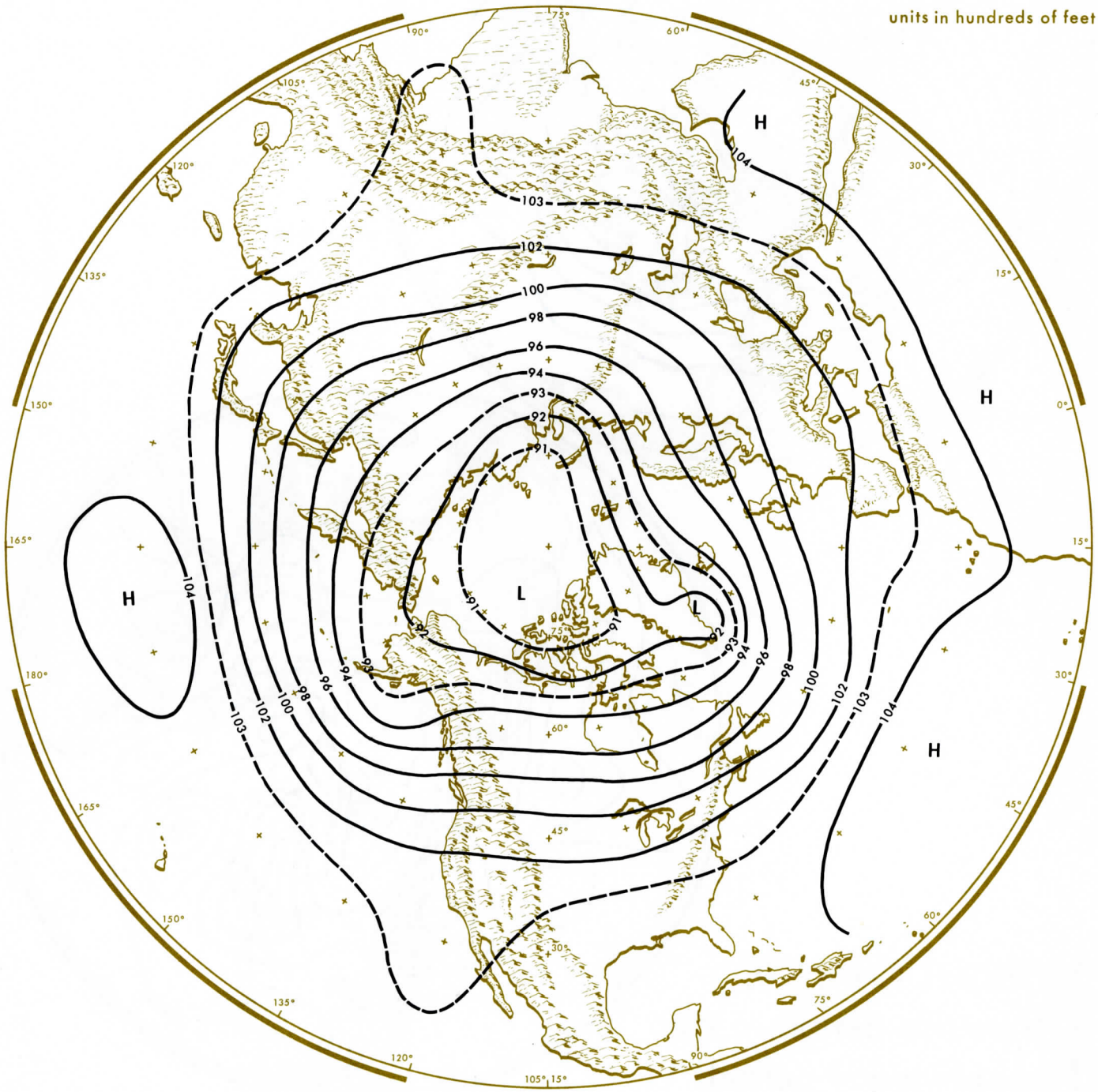
units in feet



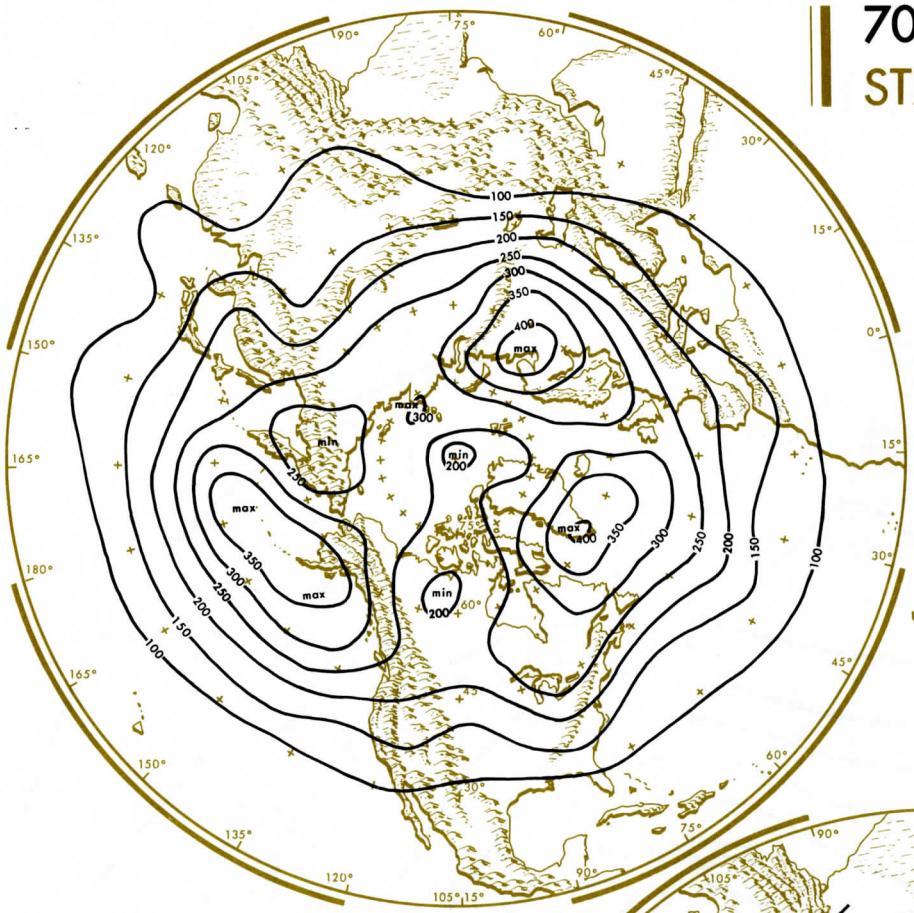
units in feet

HEIGHT CHANGE
from this period to the next five-day period

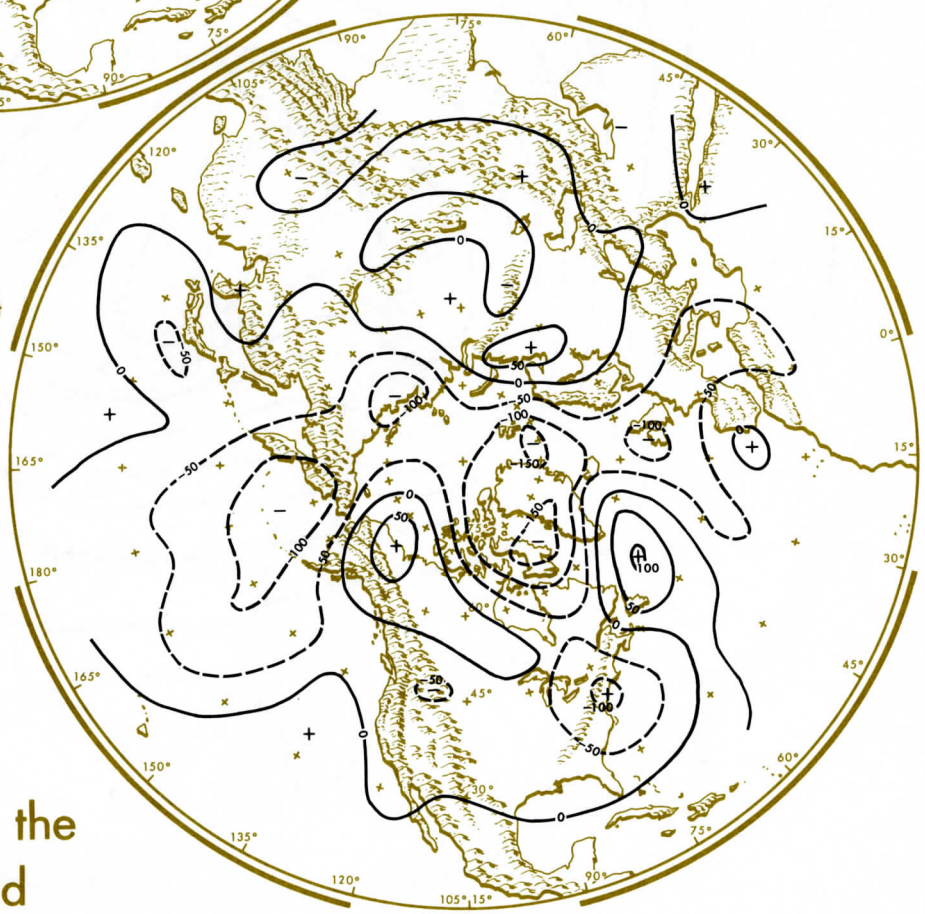
700 millibar
AVERAGE HEIGHT
October 13-17



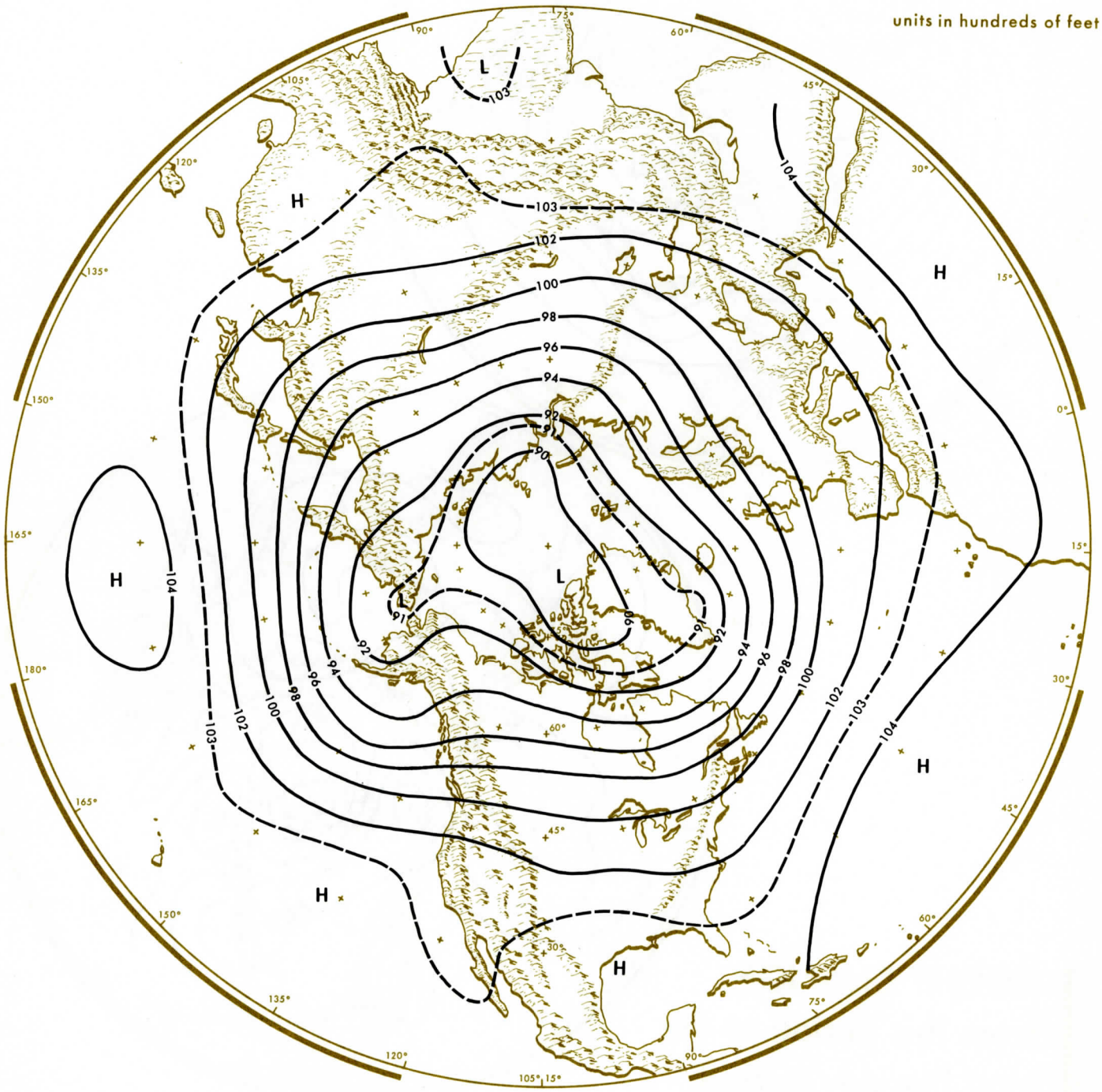
700 millibar height
STANDARD DEVIATION



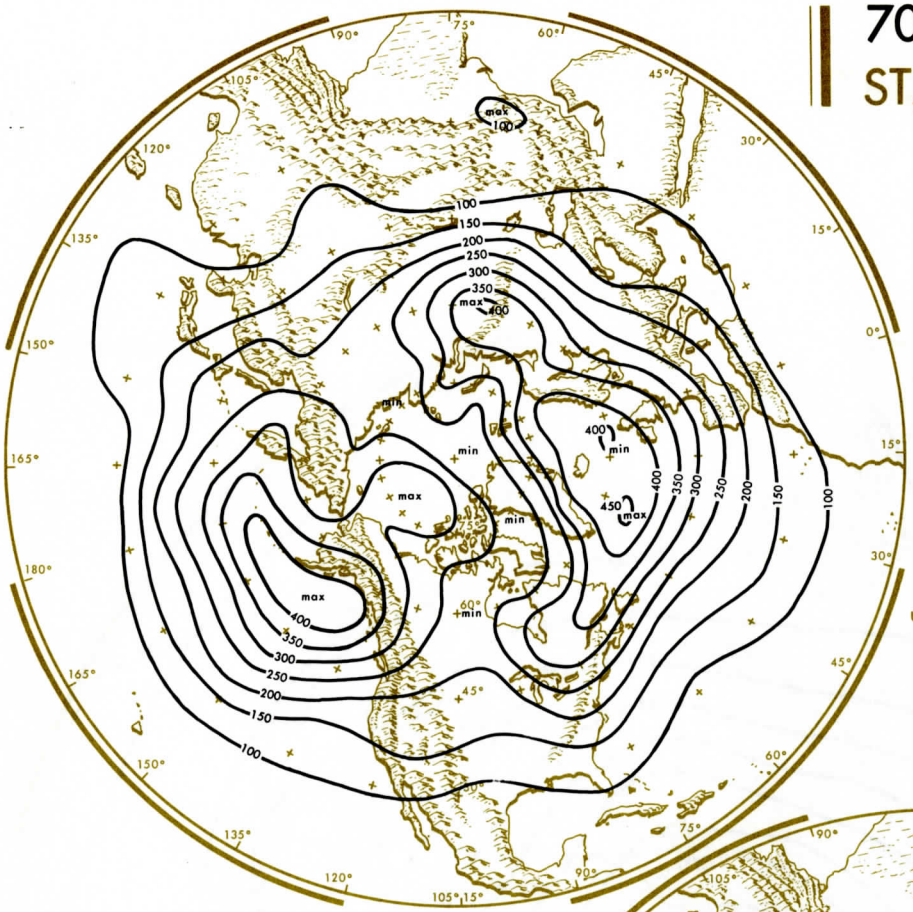
HEIGHT CHANGE
from this period to the next five-day period



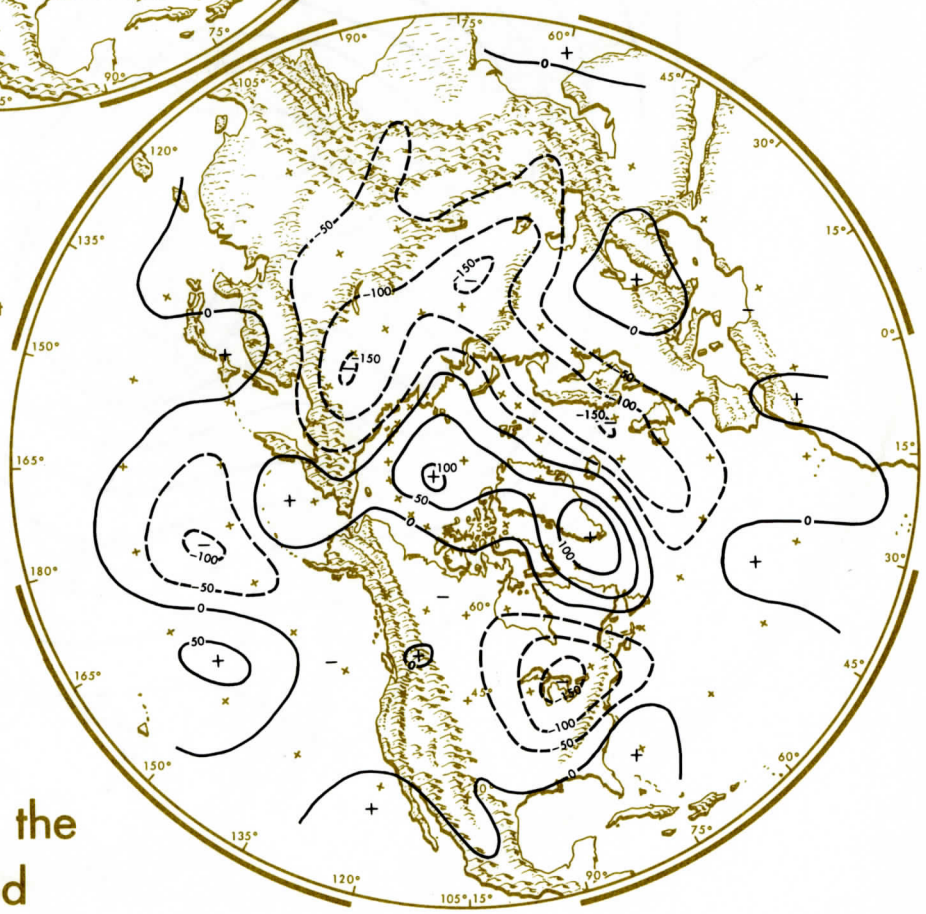
700 millibar
AVERAGE HEIGHT
October 18-22



700 millibar height
STANDARD DEVIATION



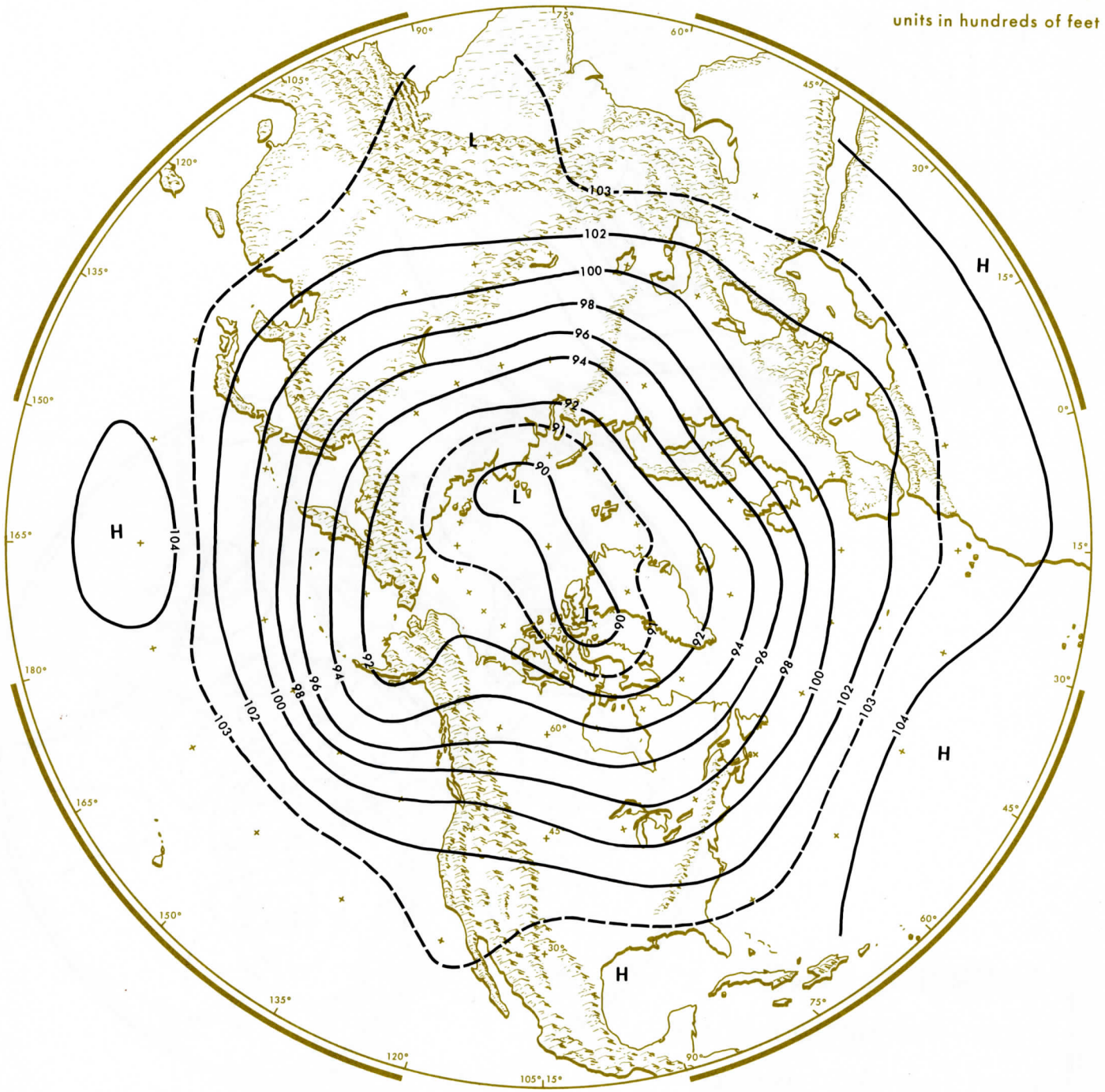
units in feet



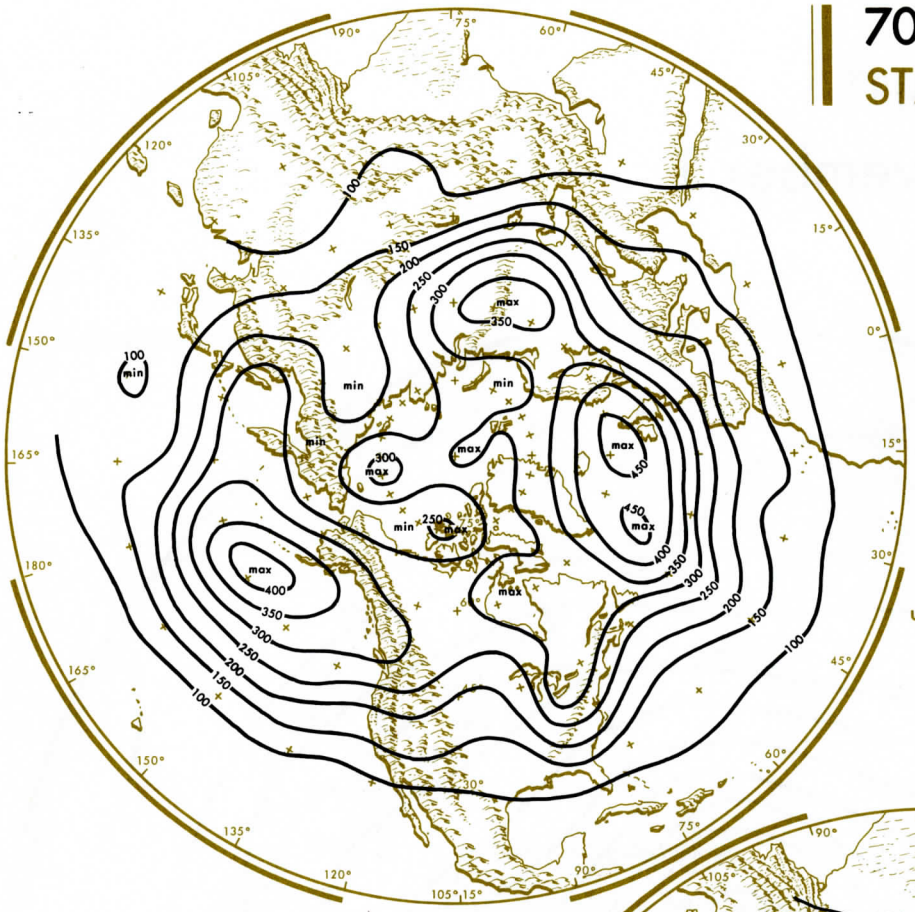
units in feet

HEIGHT CHANGE
from this period to the next five-day period

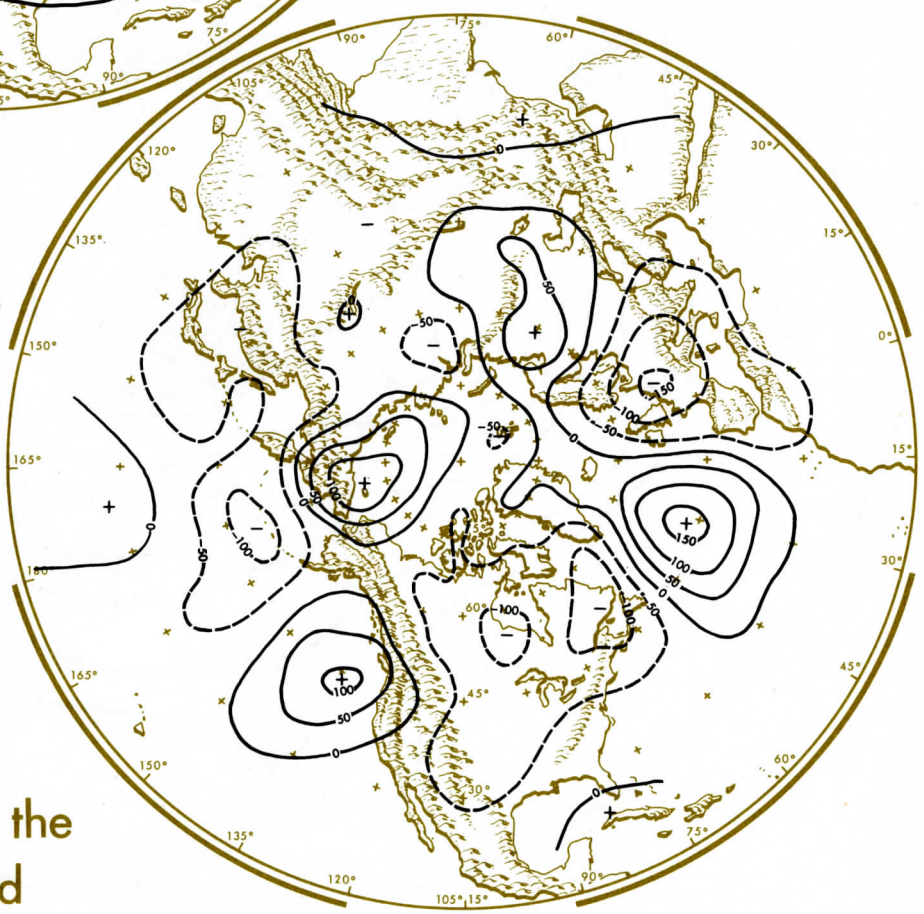
700 millibar
AVERAGE HEIGHT
October 23-27



700 millibar height
STANDARD DEVIATION



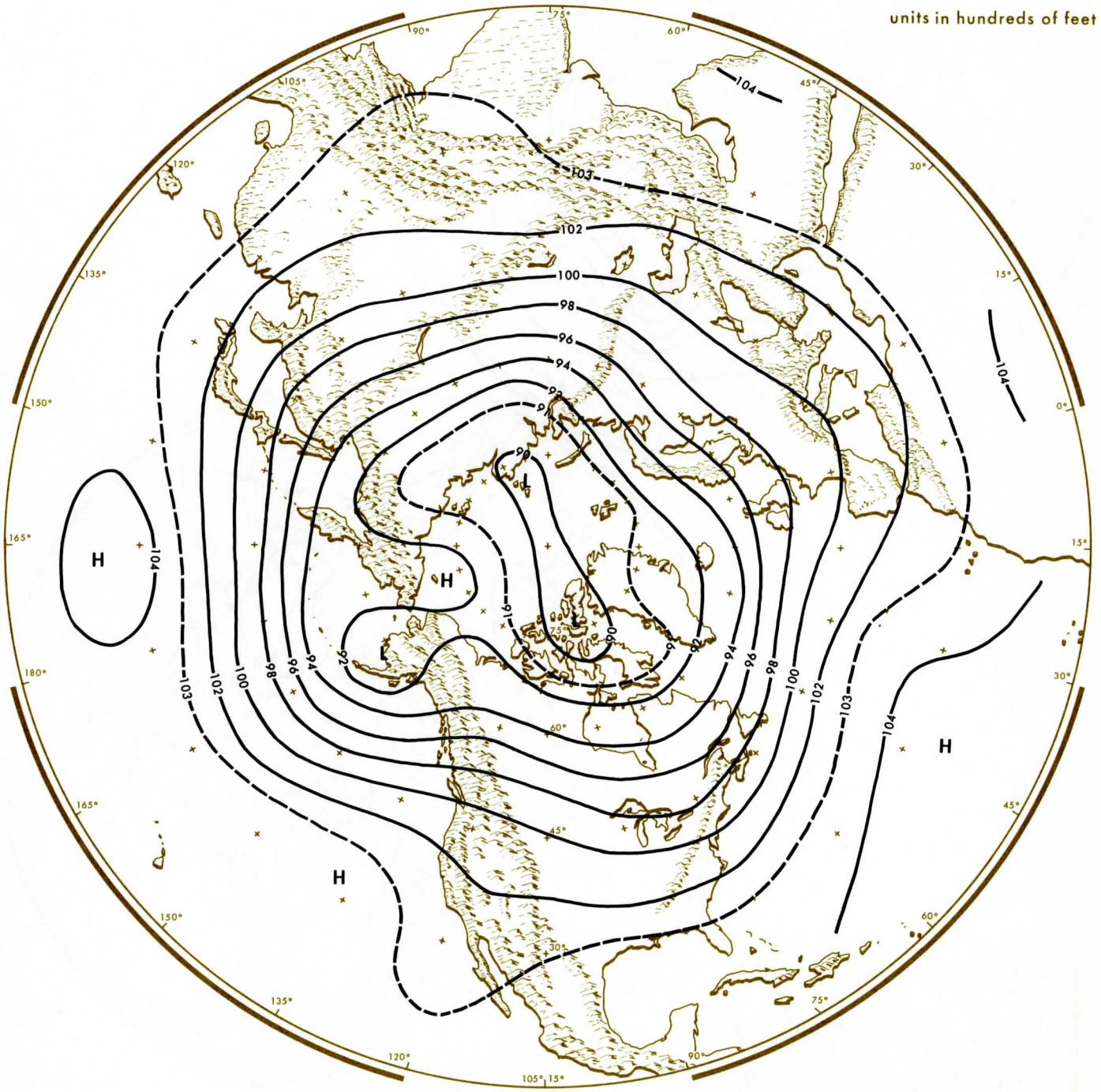
units in feet



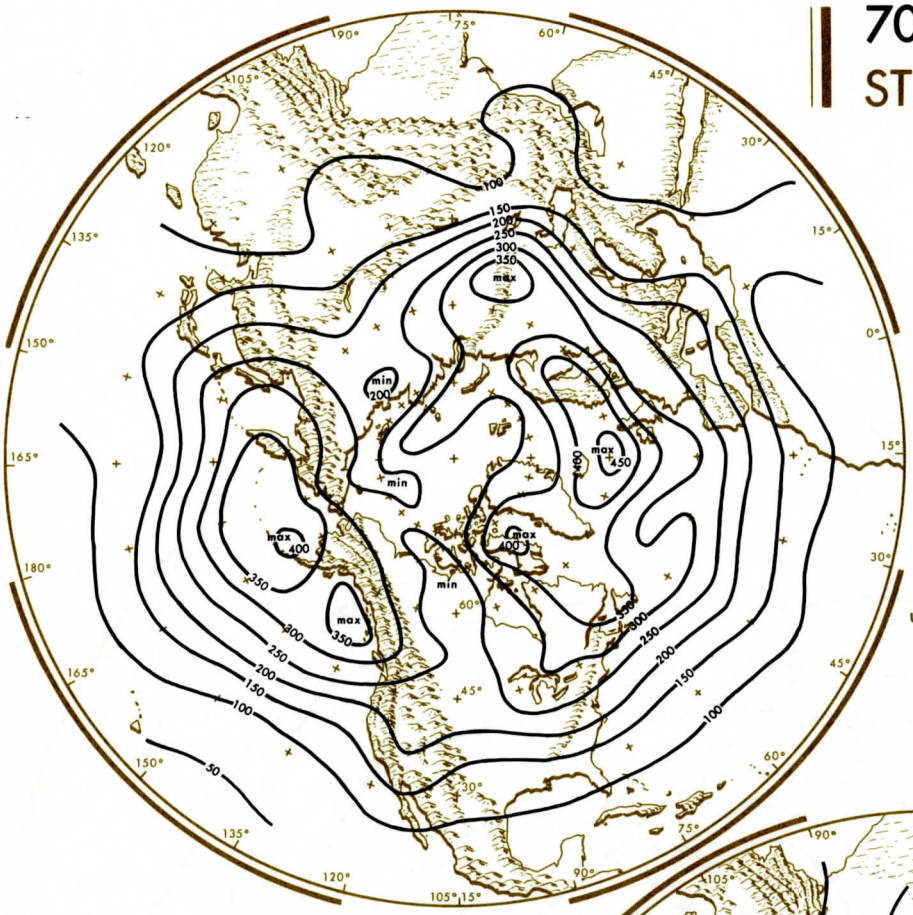
units in feet

HEIGHT CHANGE
from this period to the next five-day period

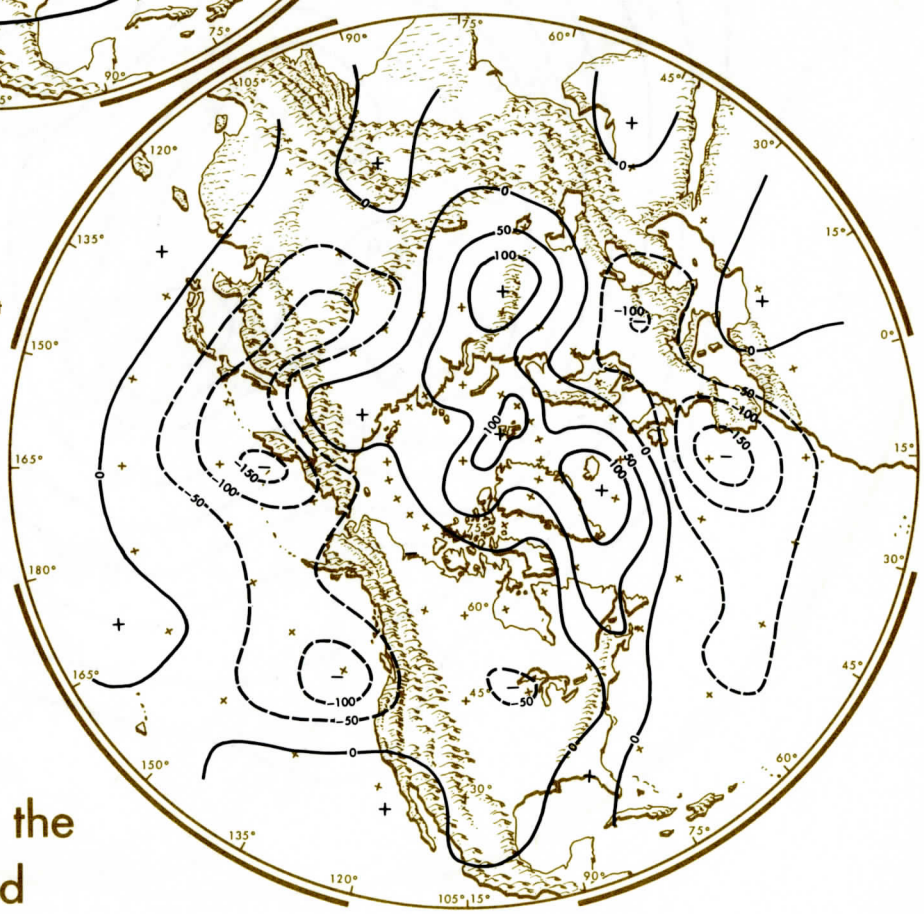
700 millibar
AVERAGE HEIGHT
October 28-November 1



700 millibar height
STANDARD DEVIATION



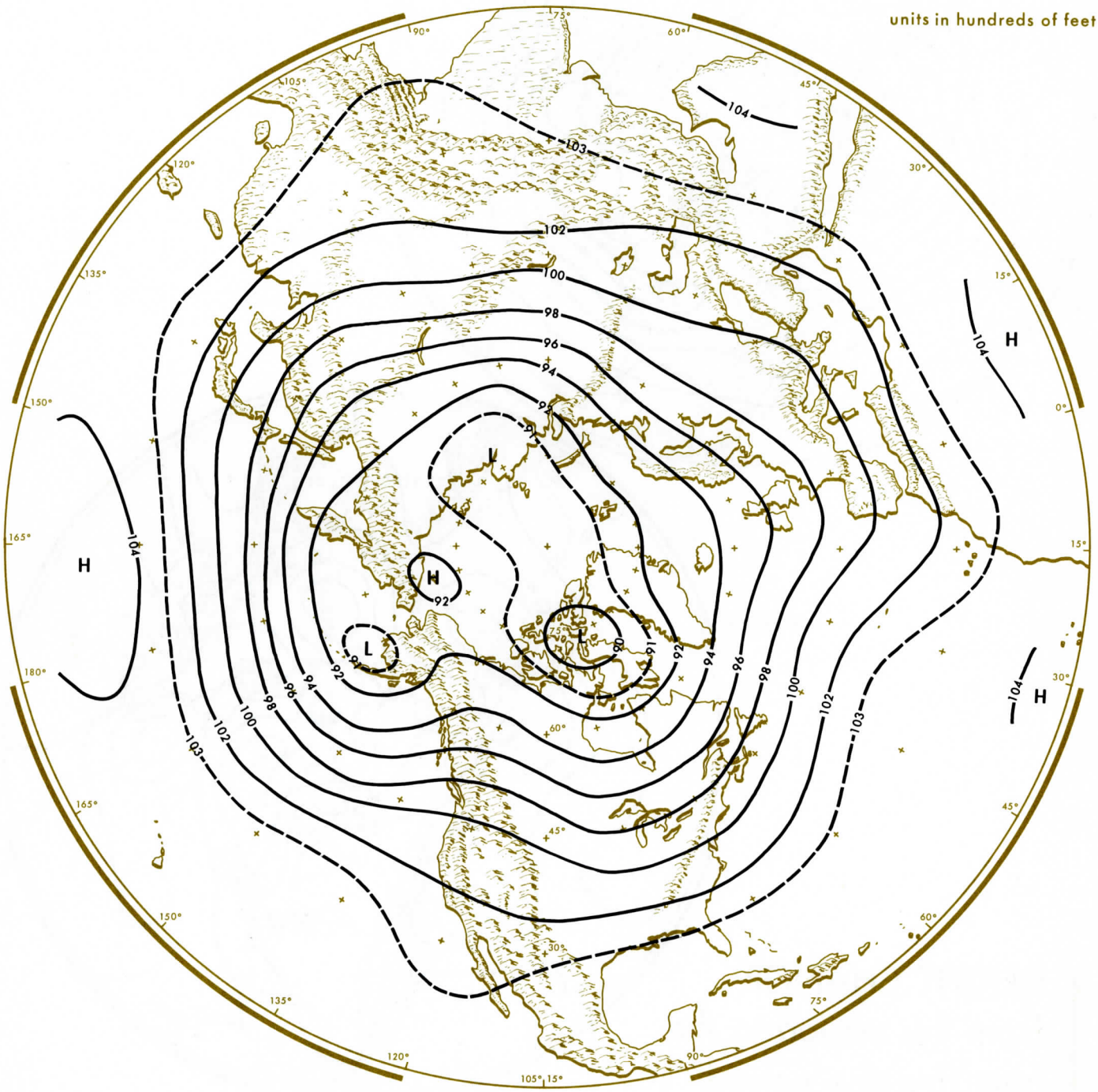
units in feet



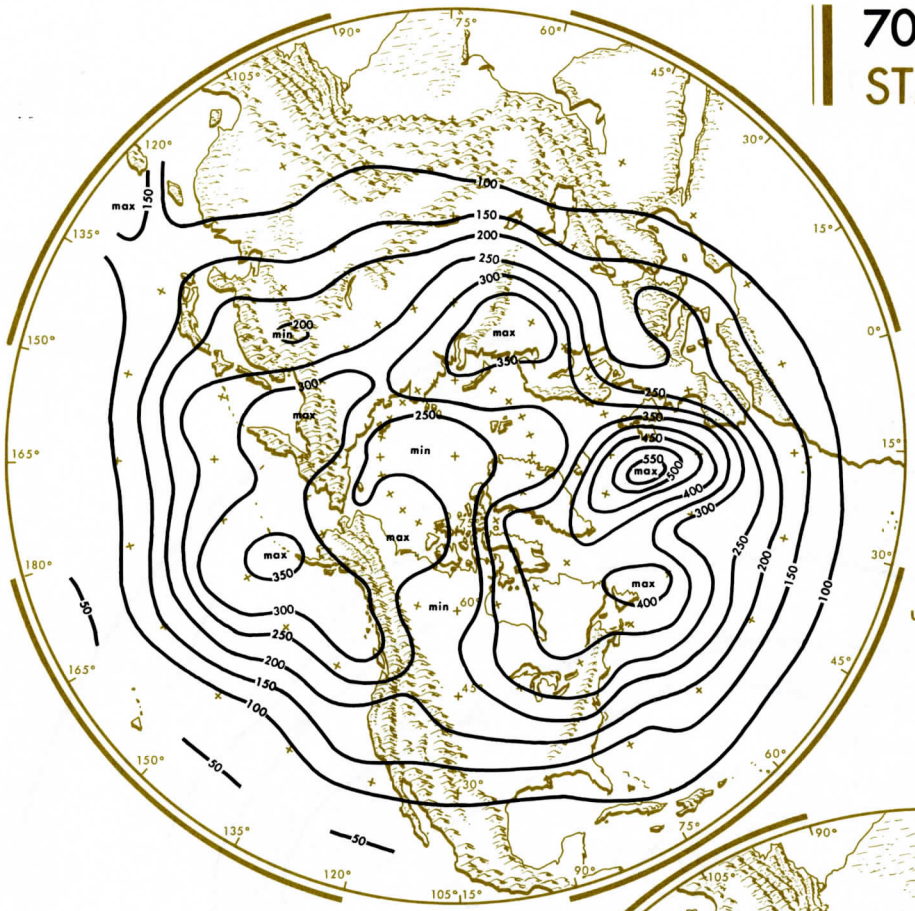
units in feet

HEIGHT CHANGE
from this period to the next five-day period

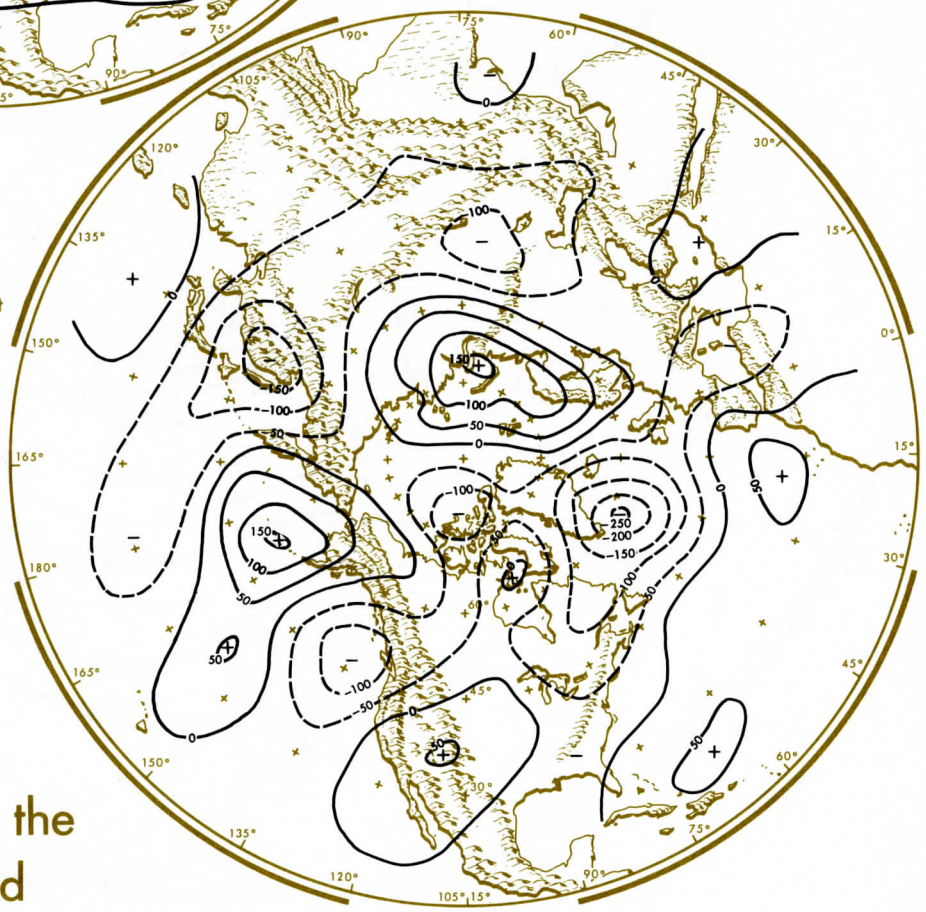
700 millibar
AVERAGE HEIGHT
November 2-6



700 millibar height
STANDARD DEVIATION



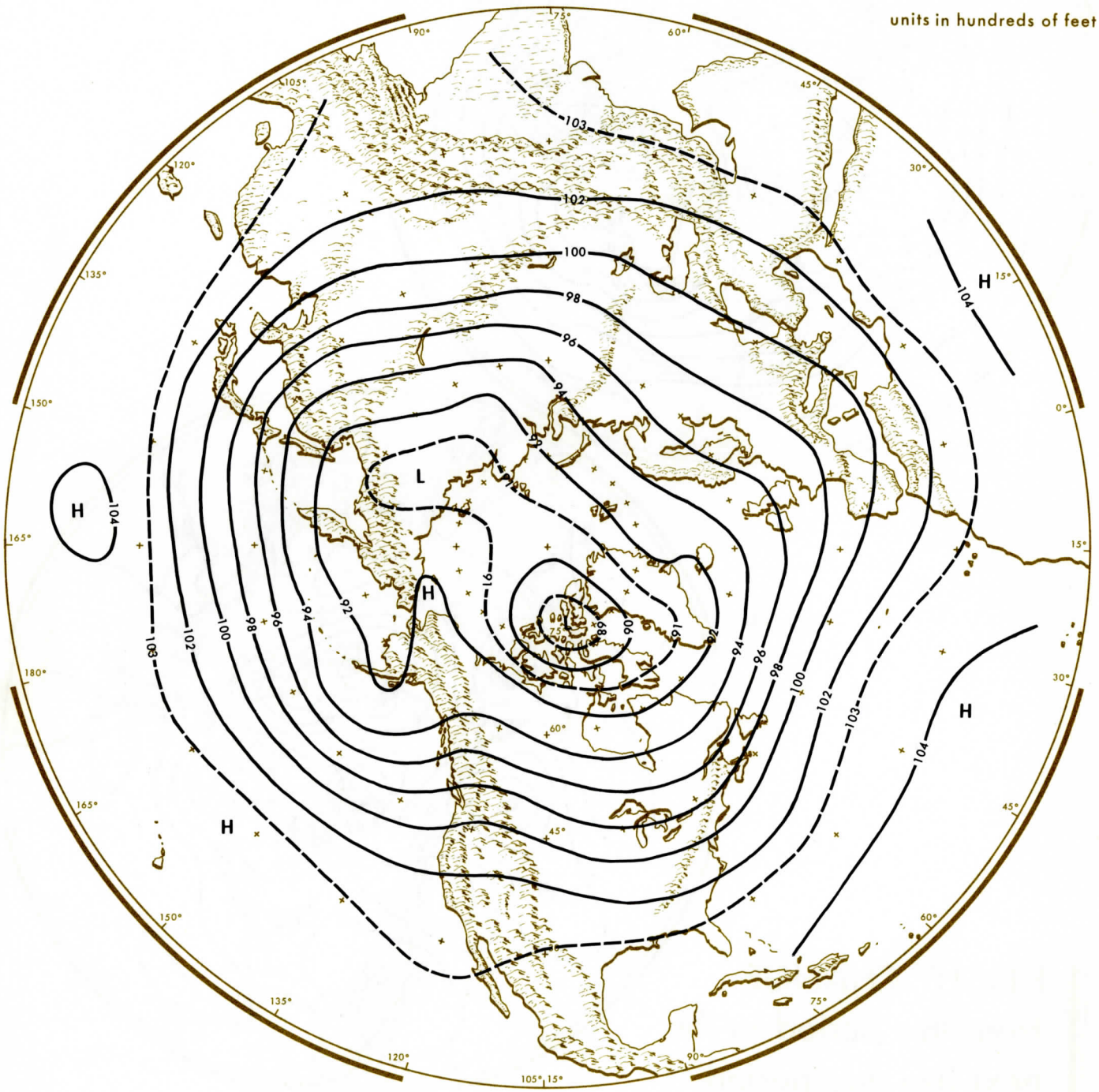
units in feet



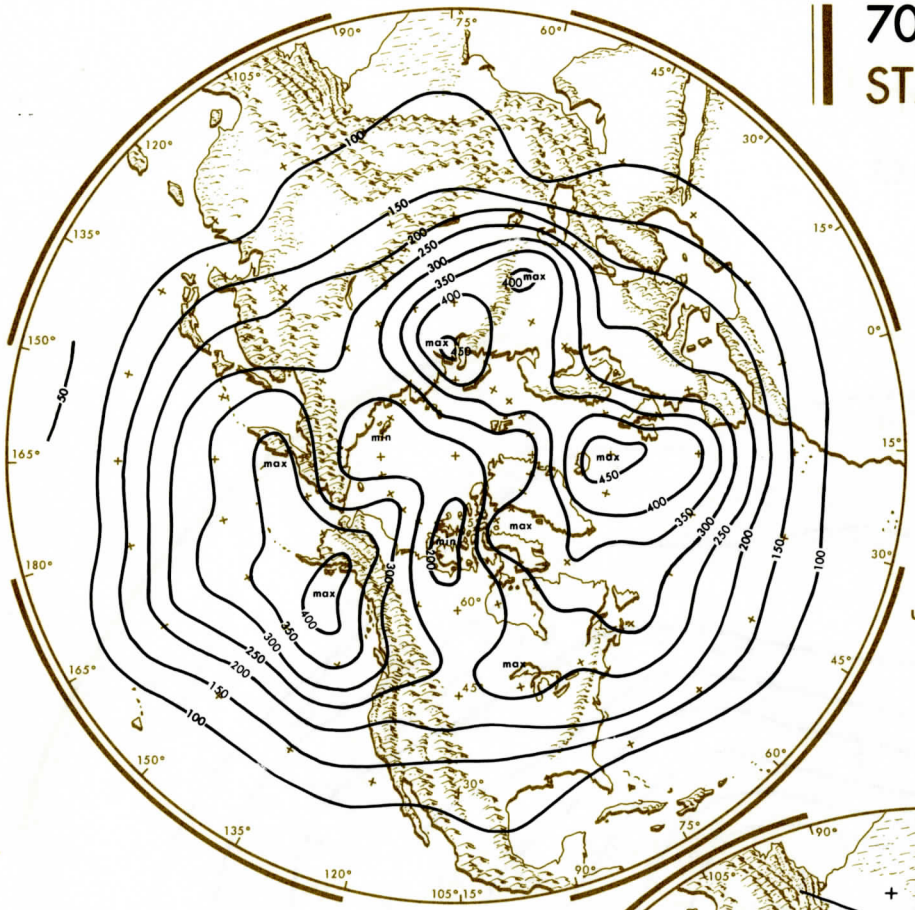
units in feet

HEIGHT CHANGE
from this period to the next five-day period

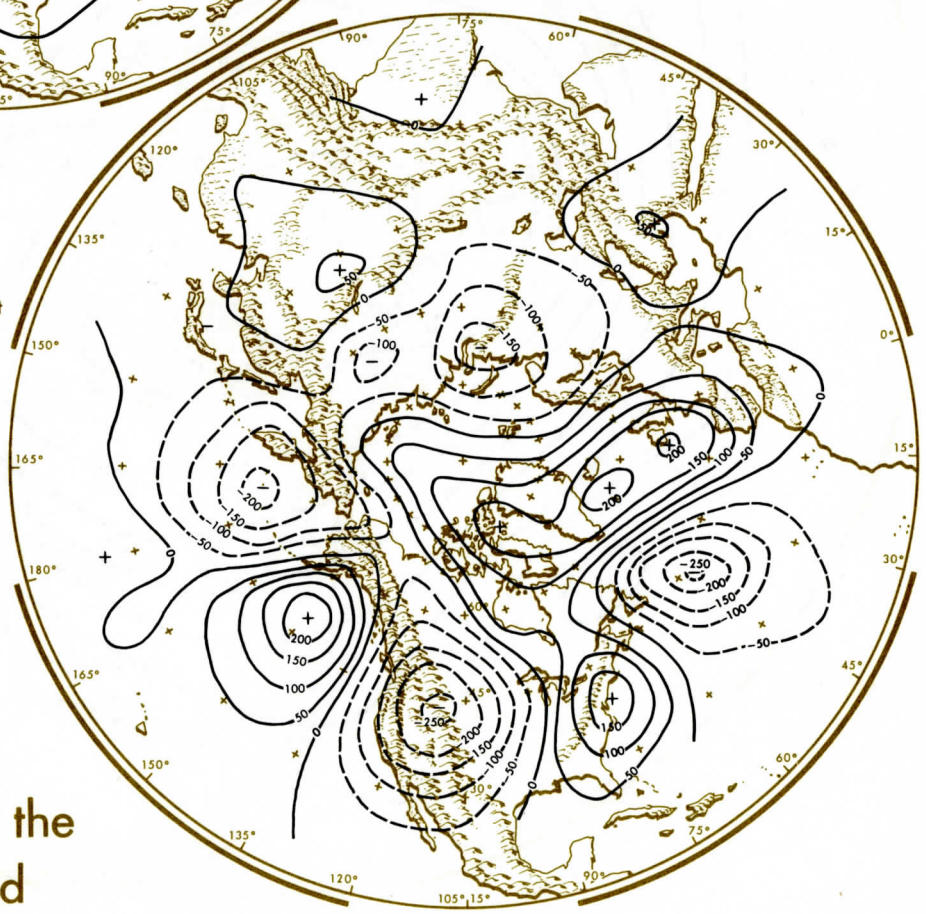
700 millibar
AVERAGE HEIGHT
November 7-11



700 millibar height
STANDARD DEVIATION



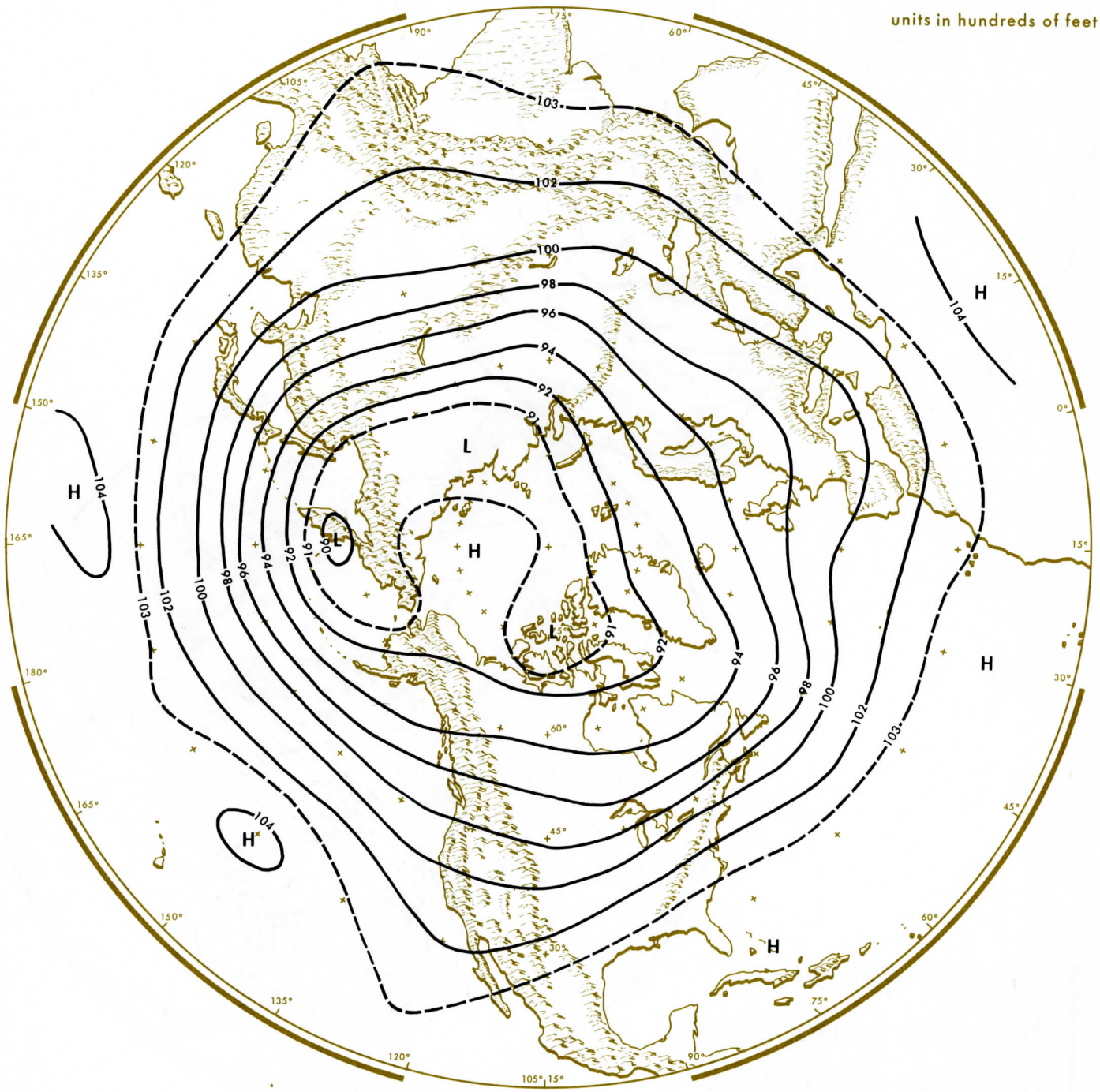
units in feet



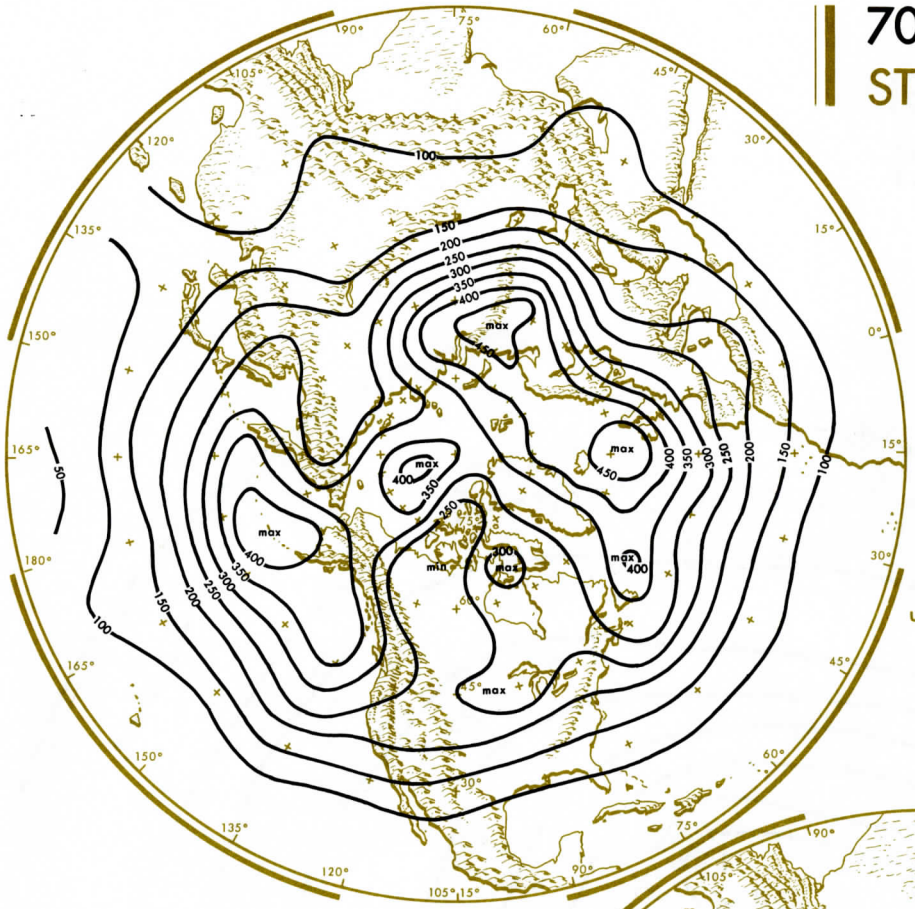
units in feet

HEIGHT CHANGE
from this period to the next five-day period

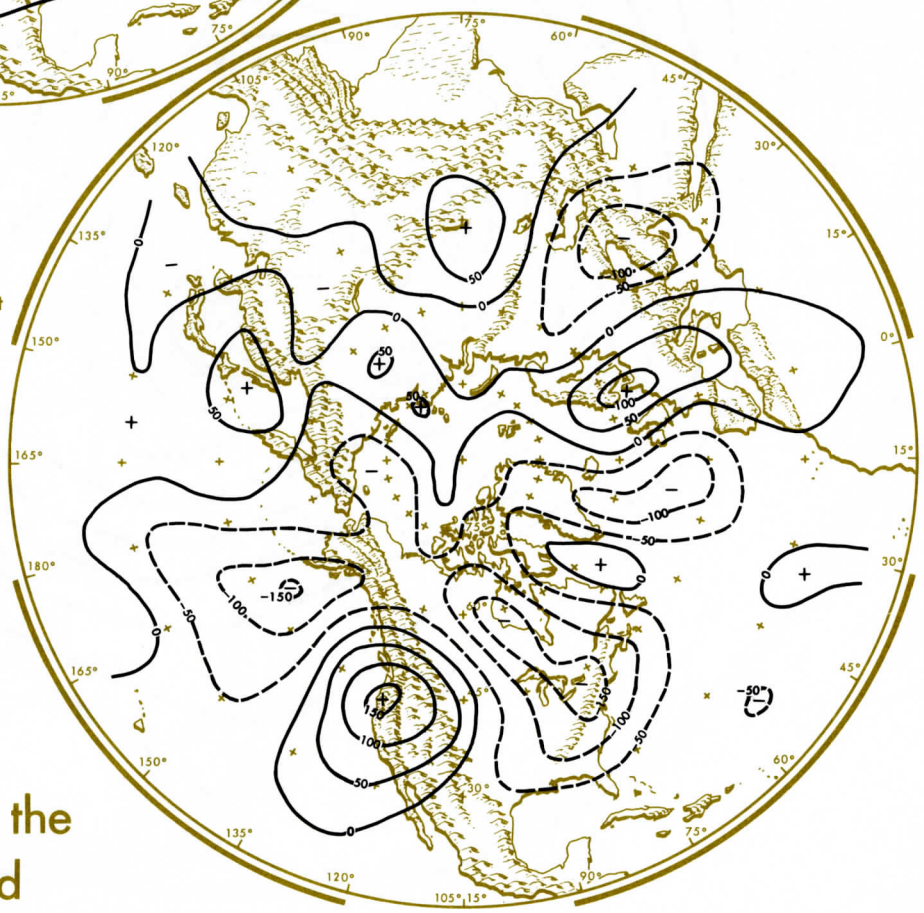
700 millibar
AVERAGE HEIGHT
November 12-16



700 millibar height
STANDARD DEVIATION



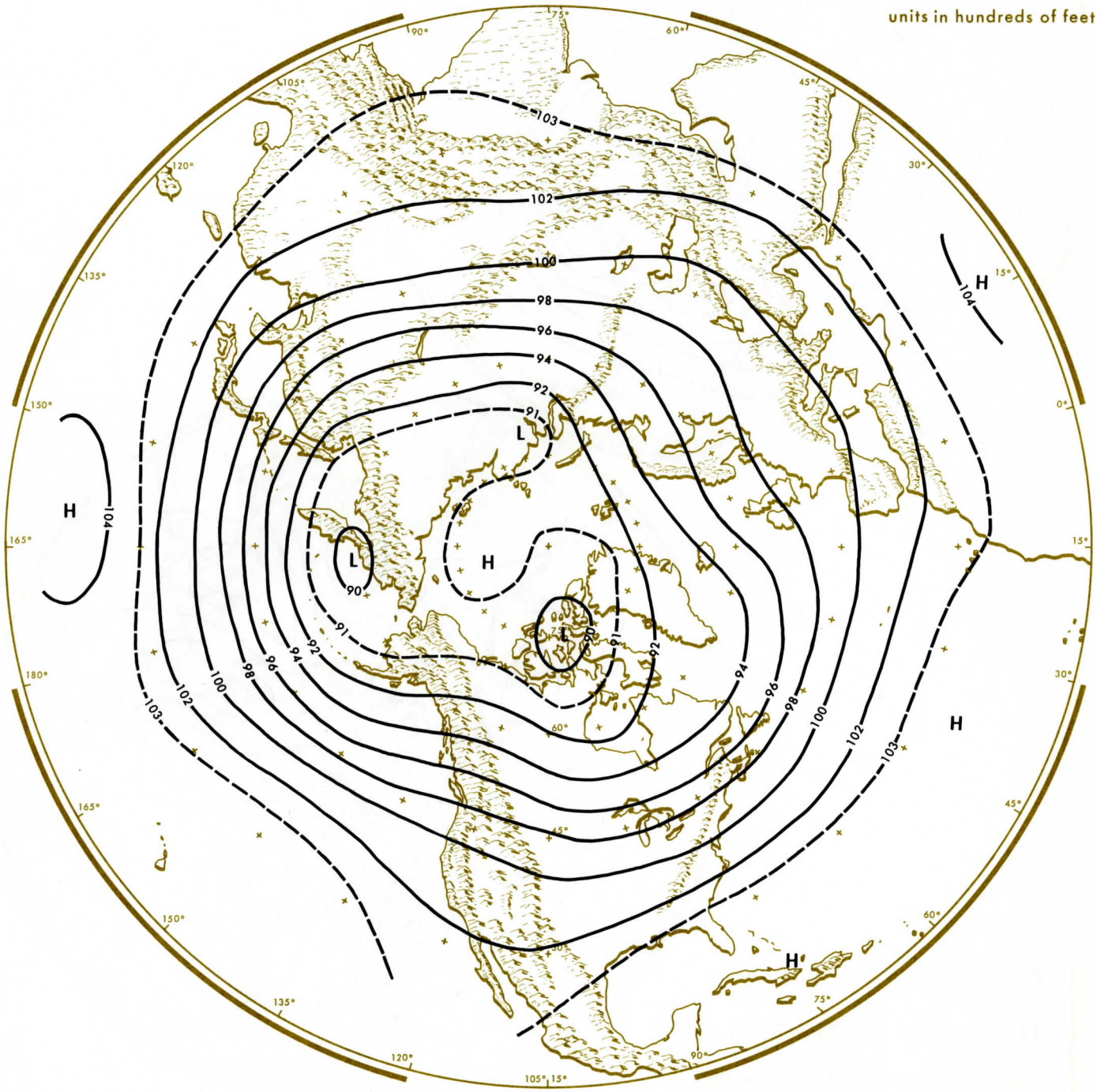
units in feet



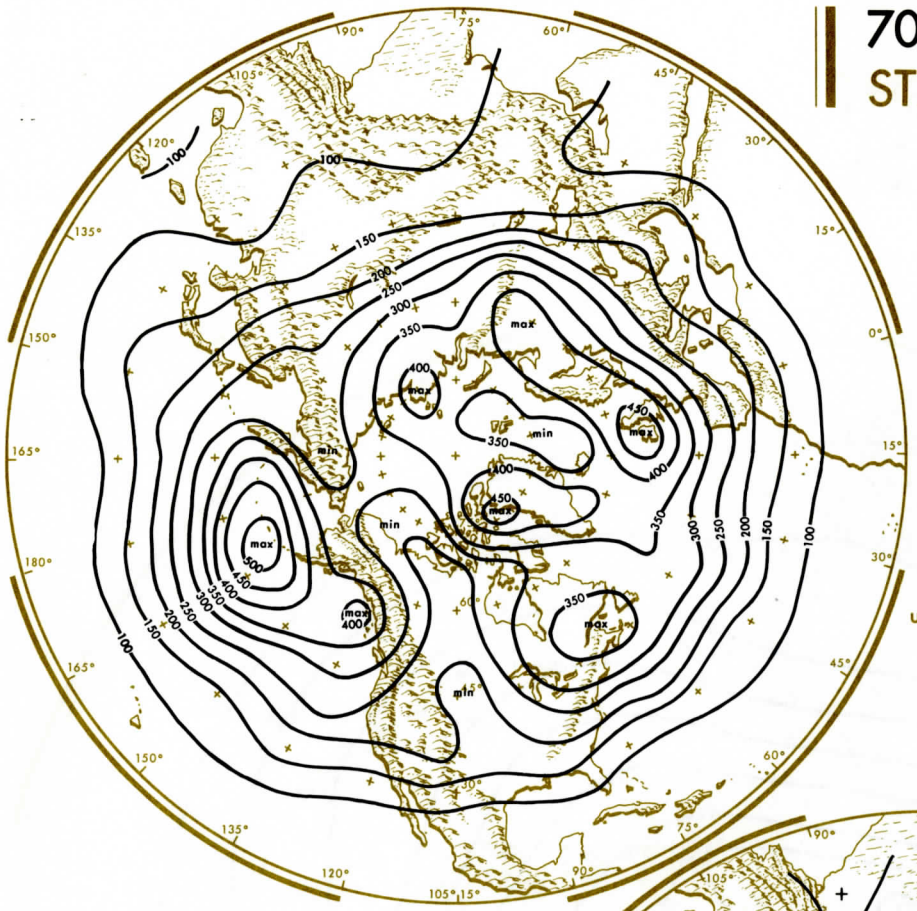
units in feet

HEIGHT CHANGE
from this period to the next five-day period

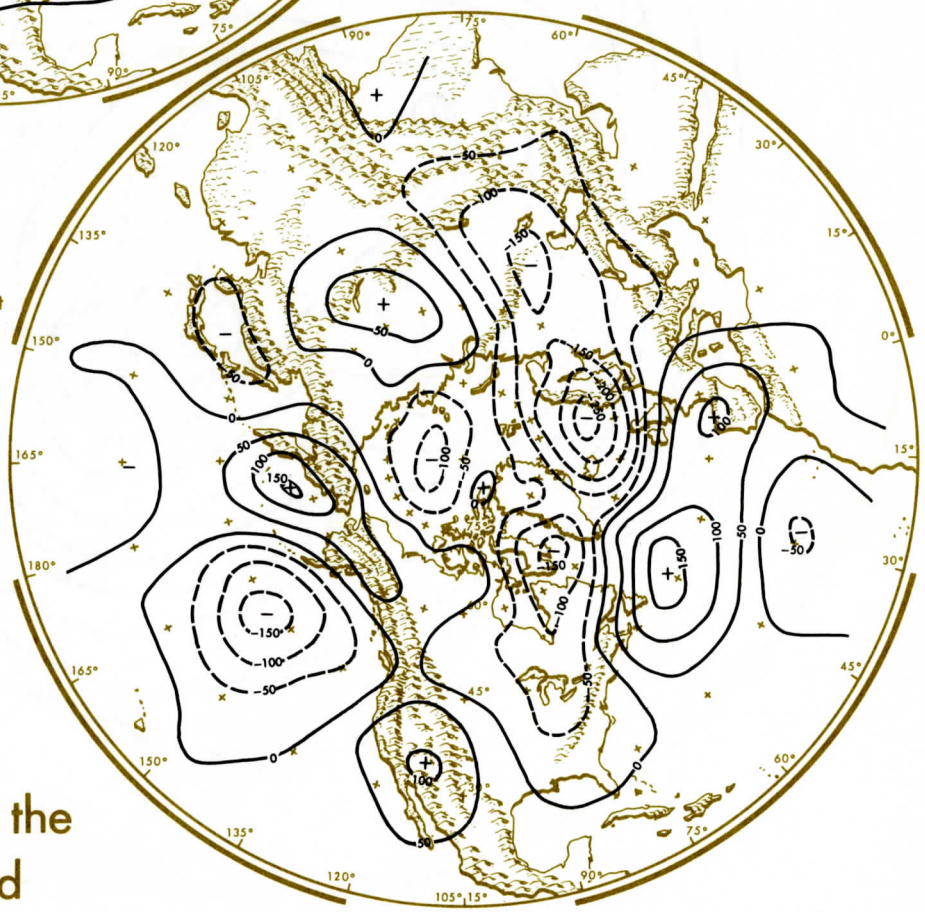
700 millibar
AVERAGE HEIGHT
November 17-21



700 millibar height
STANDARD DEVIATION



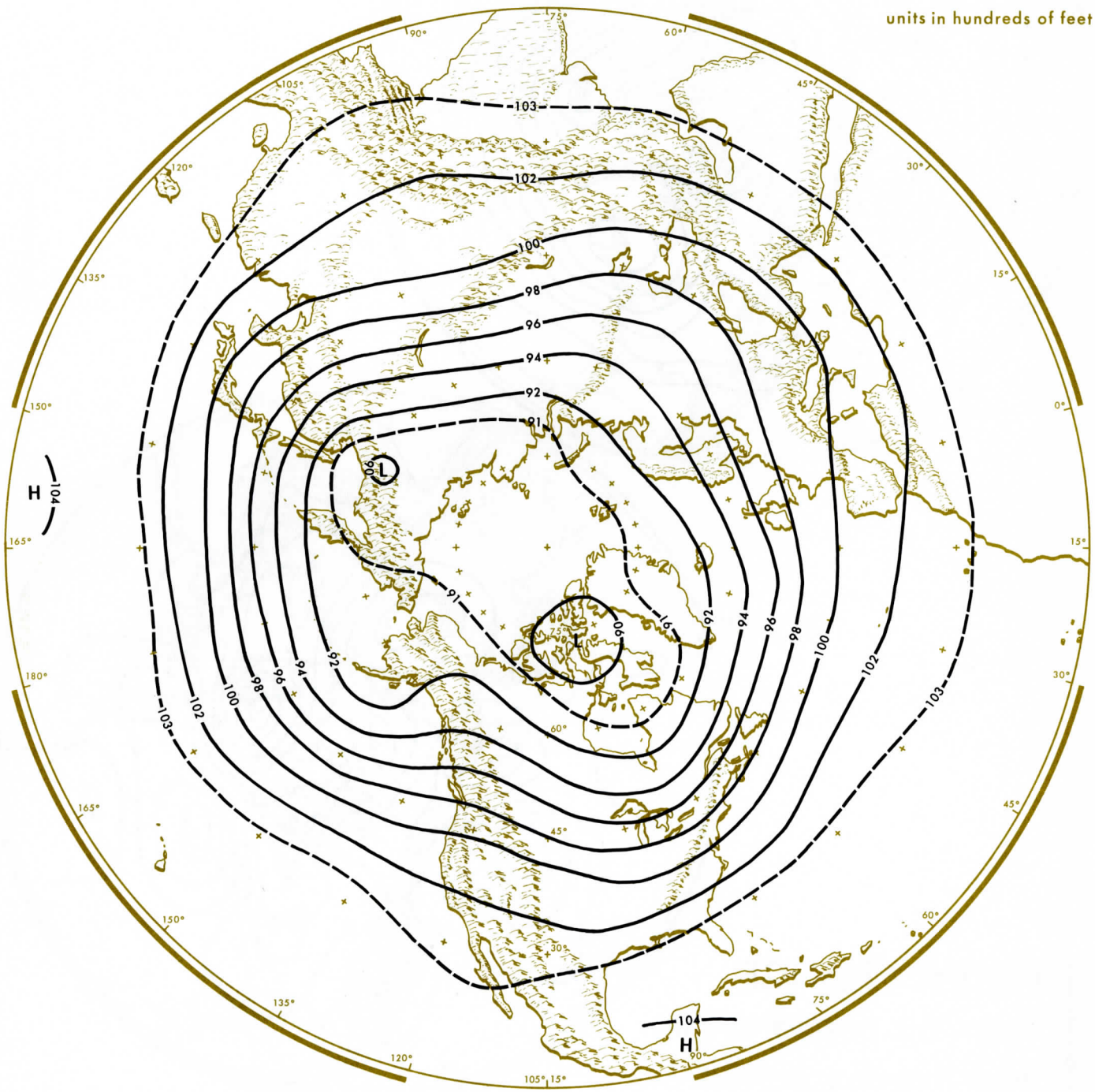
units in feet



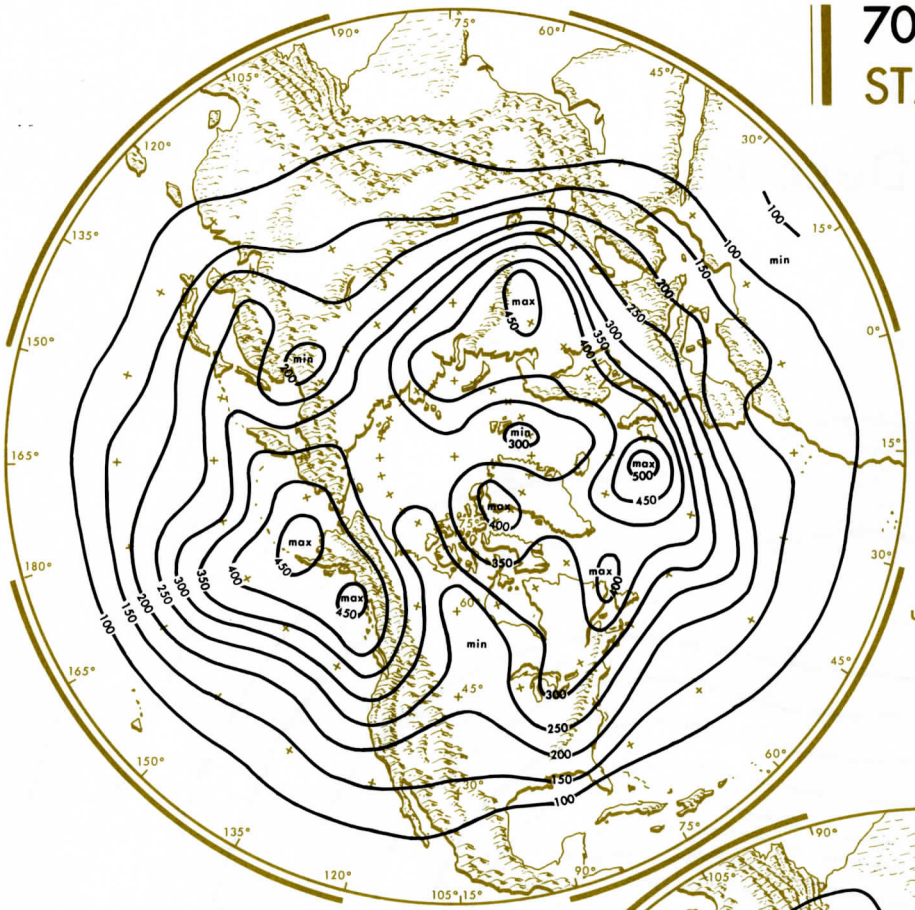
units in feet

HEIGHT CHANGE
from this period to the next five-day period

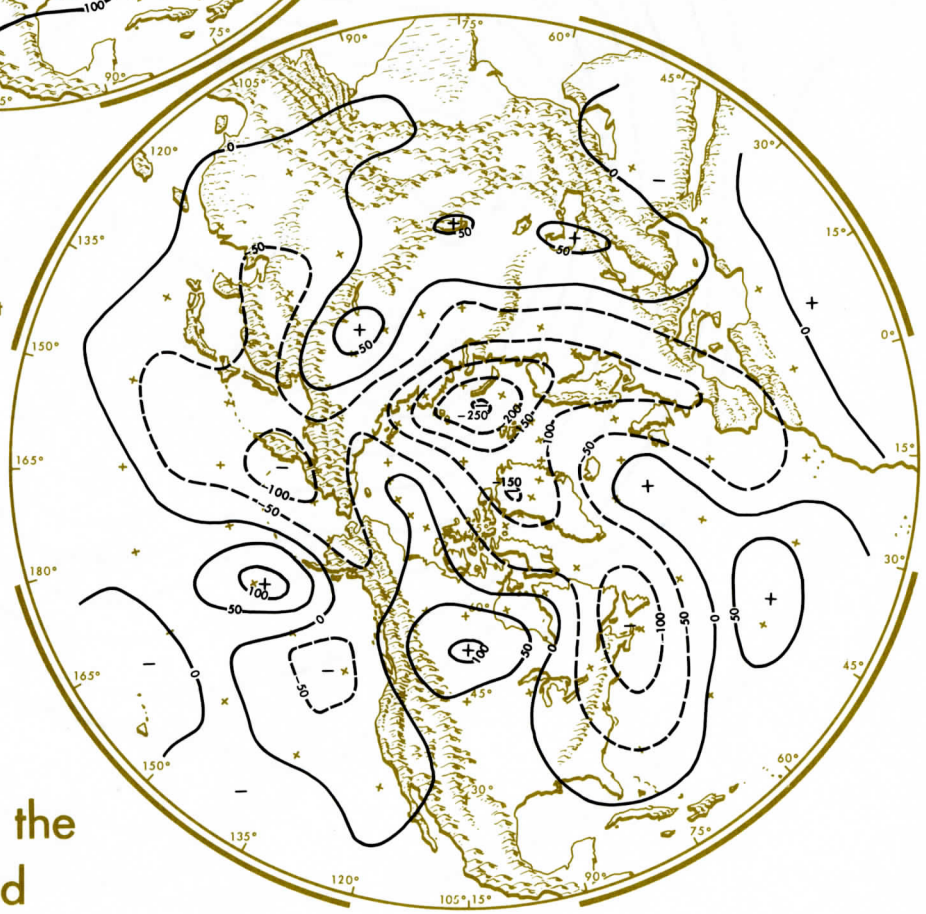
700 millibar
AVERAGE HEIGHT
November 22-26



700 millibar height
STANDARD DEVIATION



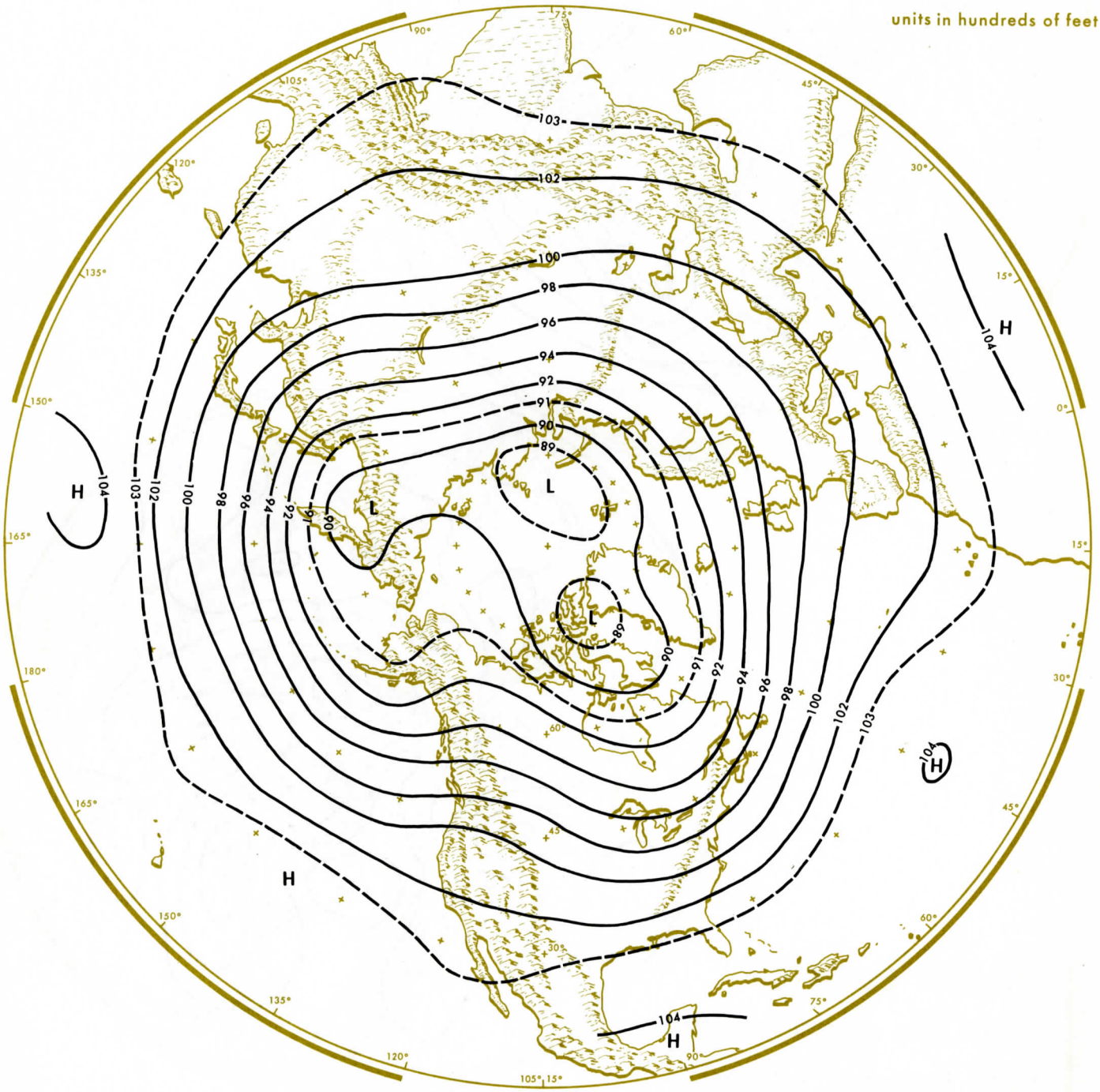
units in feet



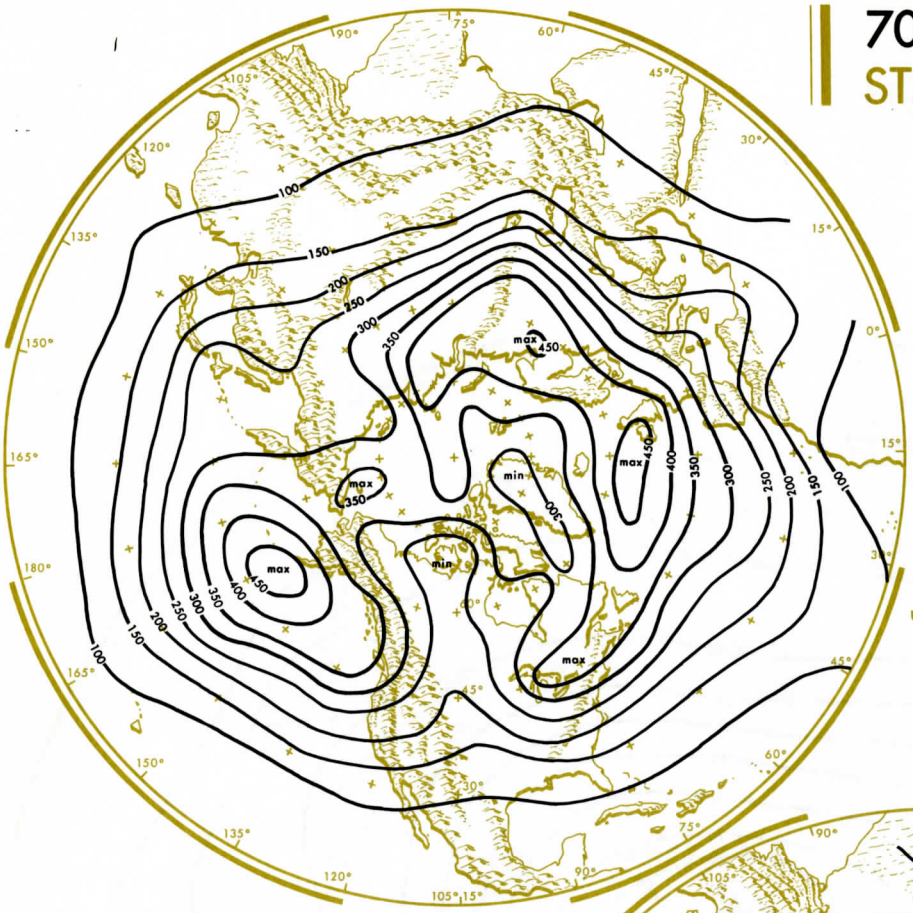
units in feet

HEIGHT CHANGE
from this period to the next five-day period

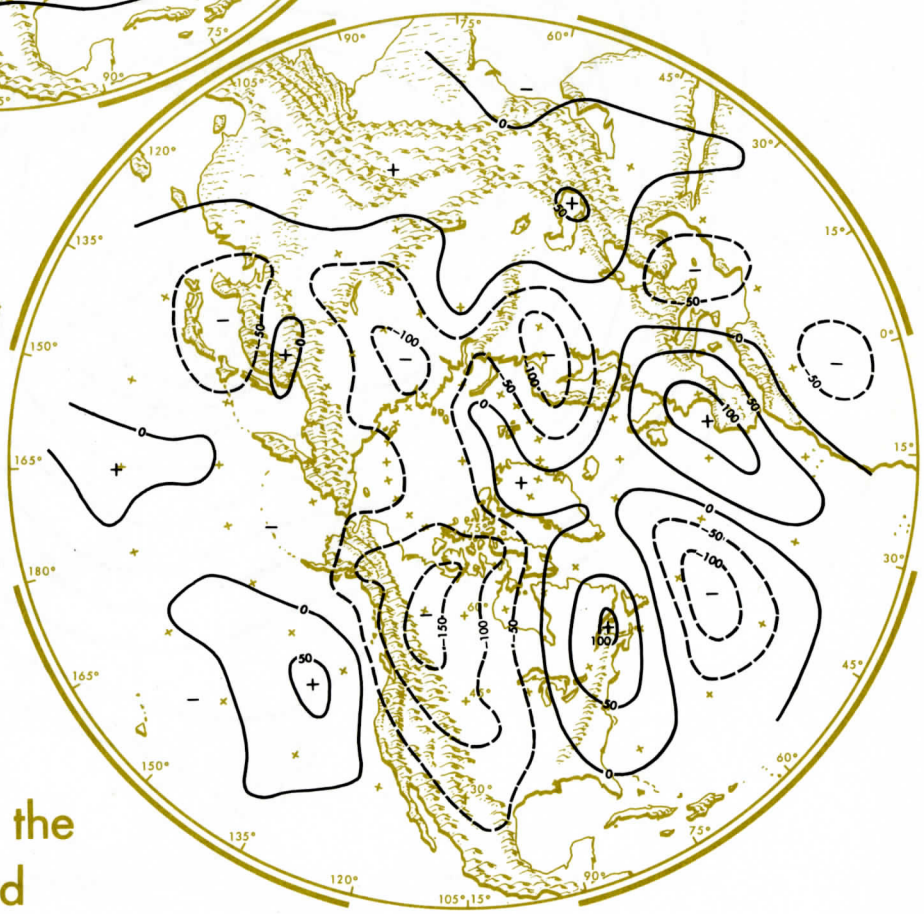
700 millibar
AVERAGE HEIGHT
November 27-December 1



700 millibar height
STANDARD DEVIATION



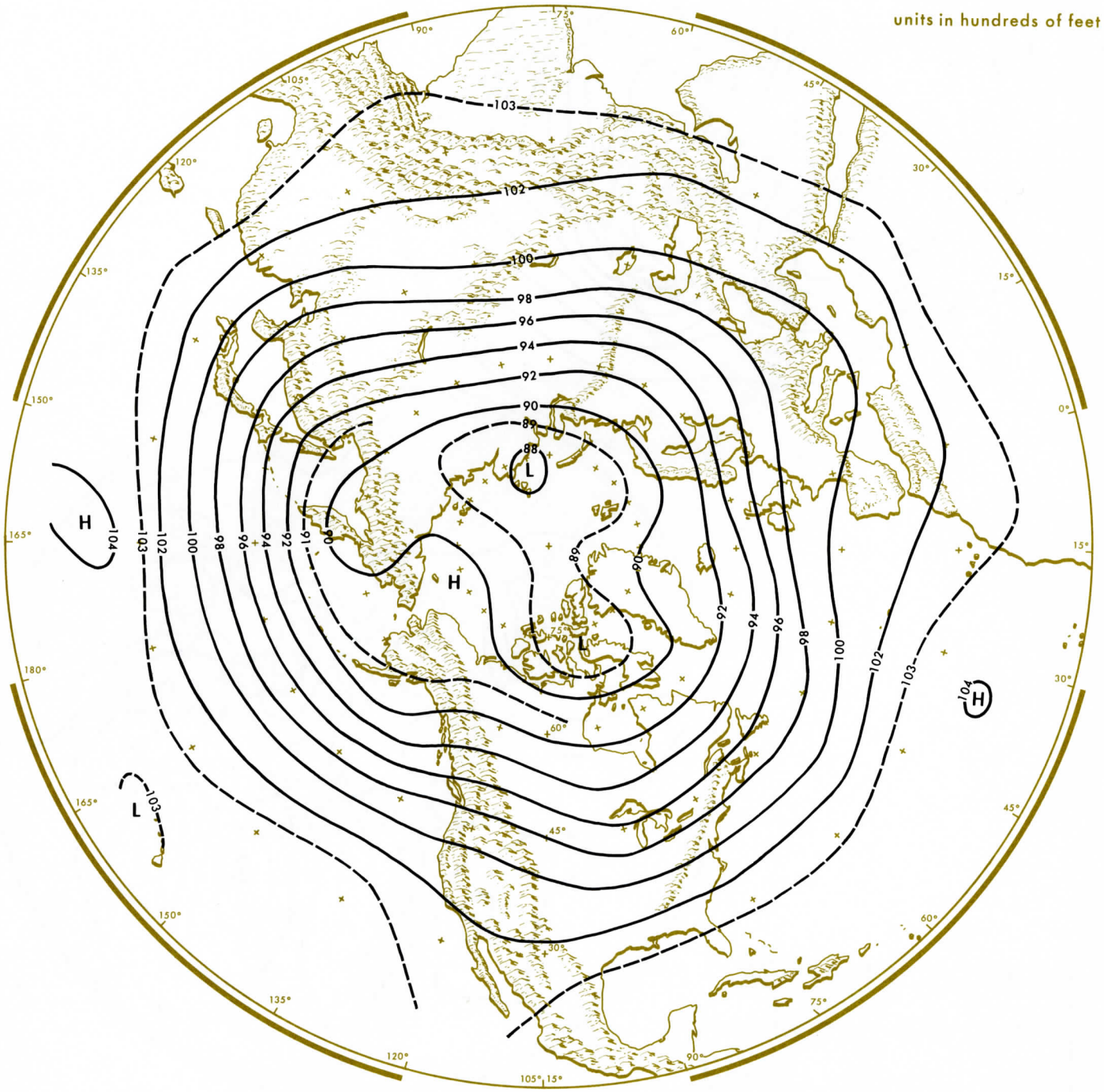
units in feet



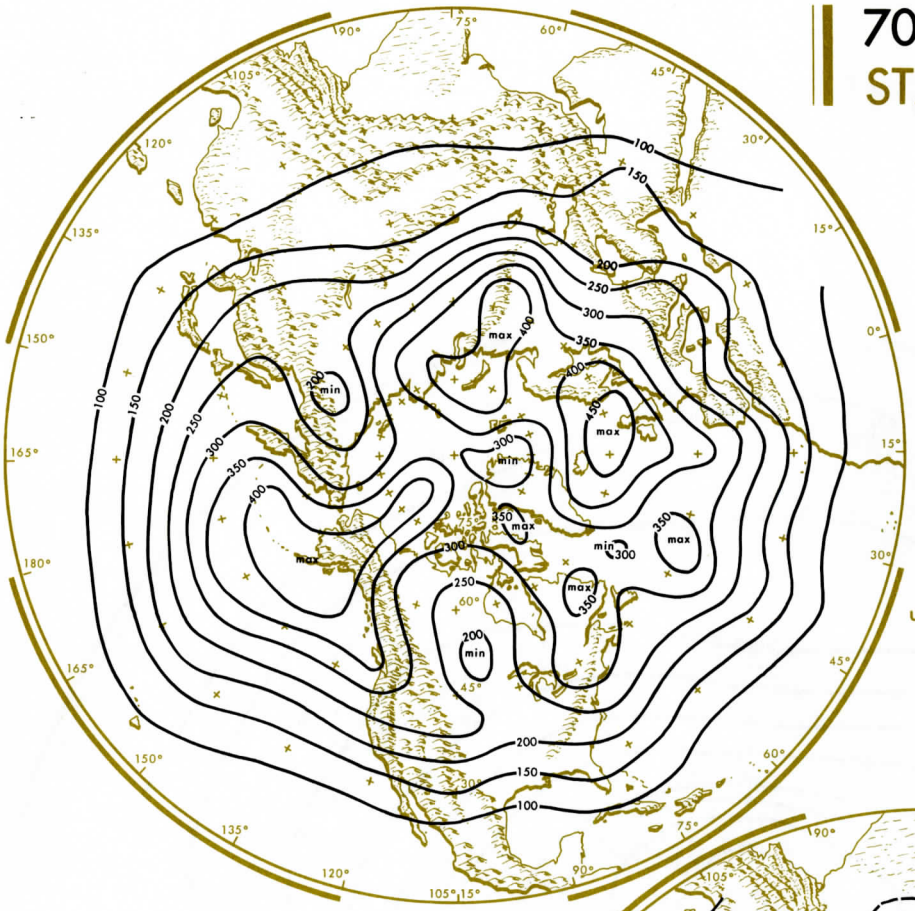
units in feet

HEIGHT CHANGE
from this period to the next five-day period

700 millibar
AVERAGE HEIGHT
December 2-6

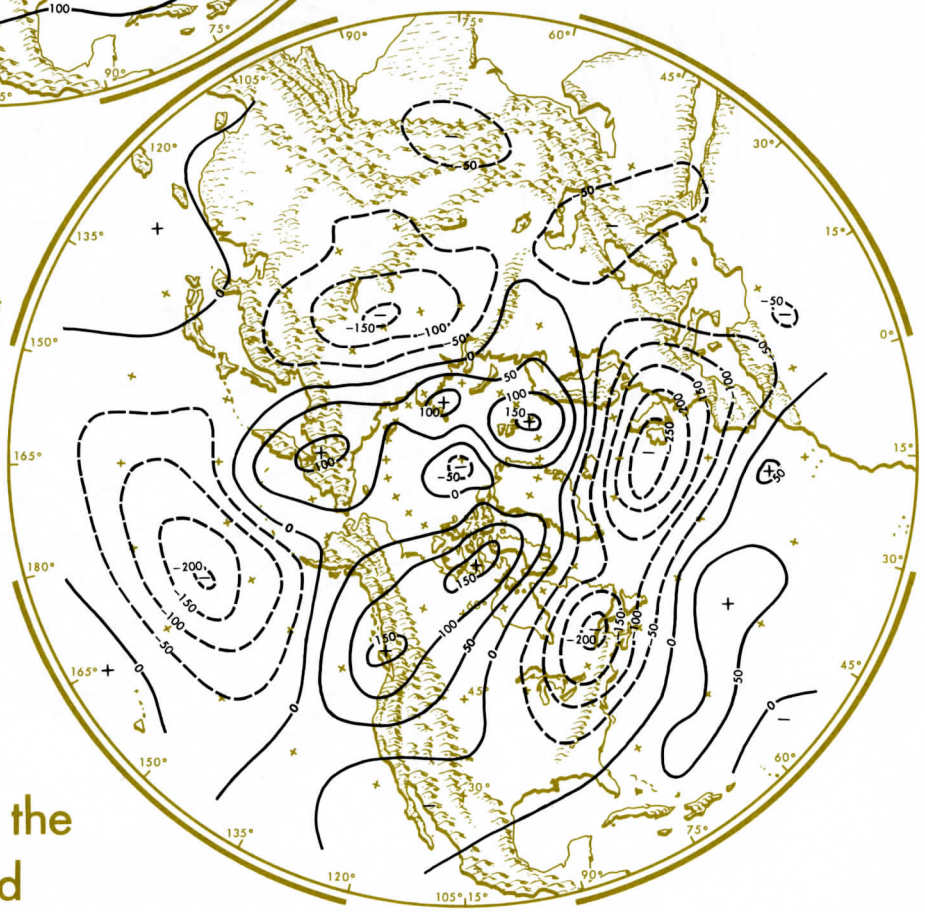


700 millibar height
STANDARD DEVIATION



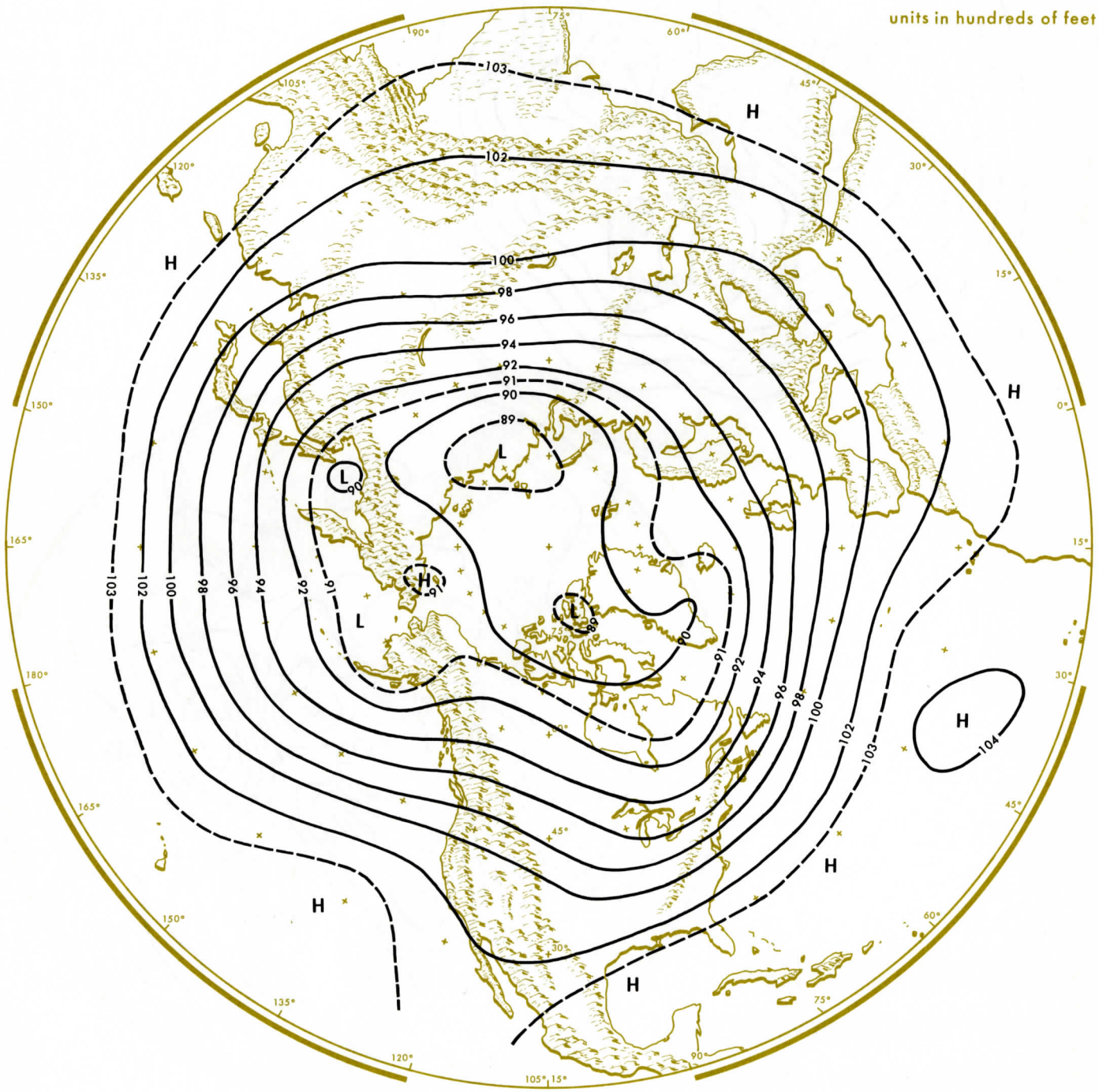
units in feet

HEIGHT CHANGE
from this period to the next five-day period

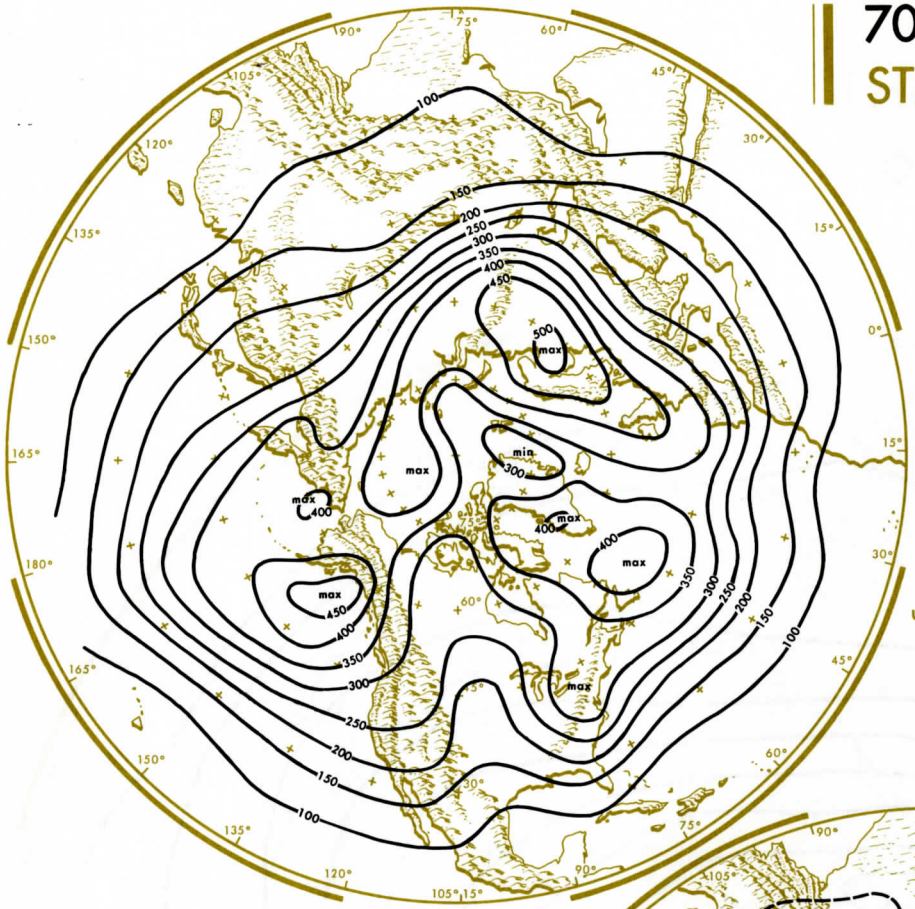


units in feet

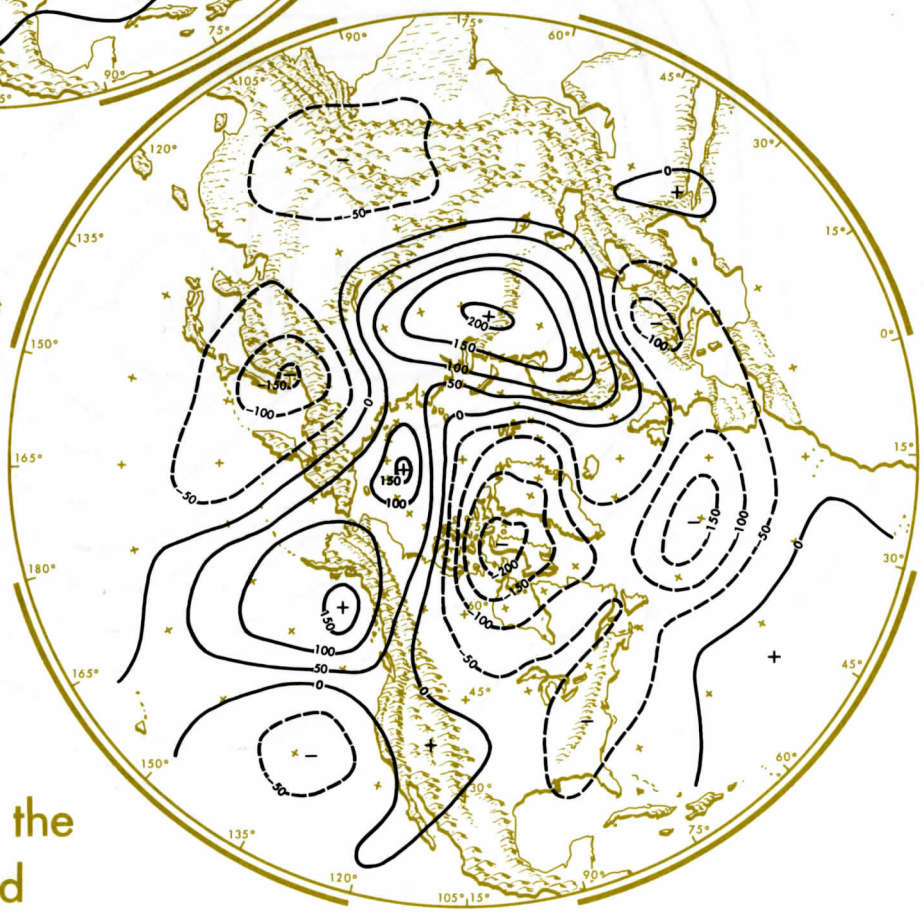
700 millibar
AVERAGE HEIGHT
December 7-11



700 millibar height
STANDARD DEVIATION



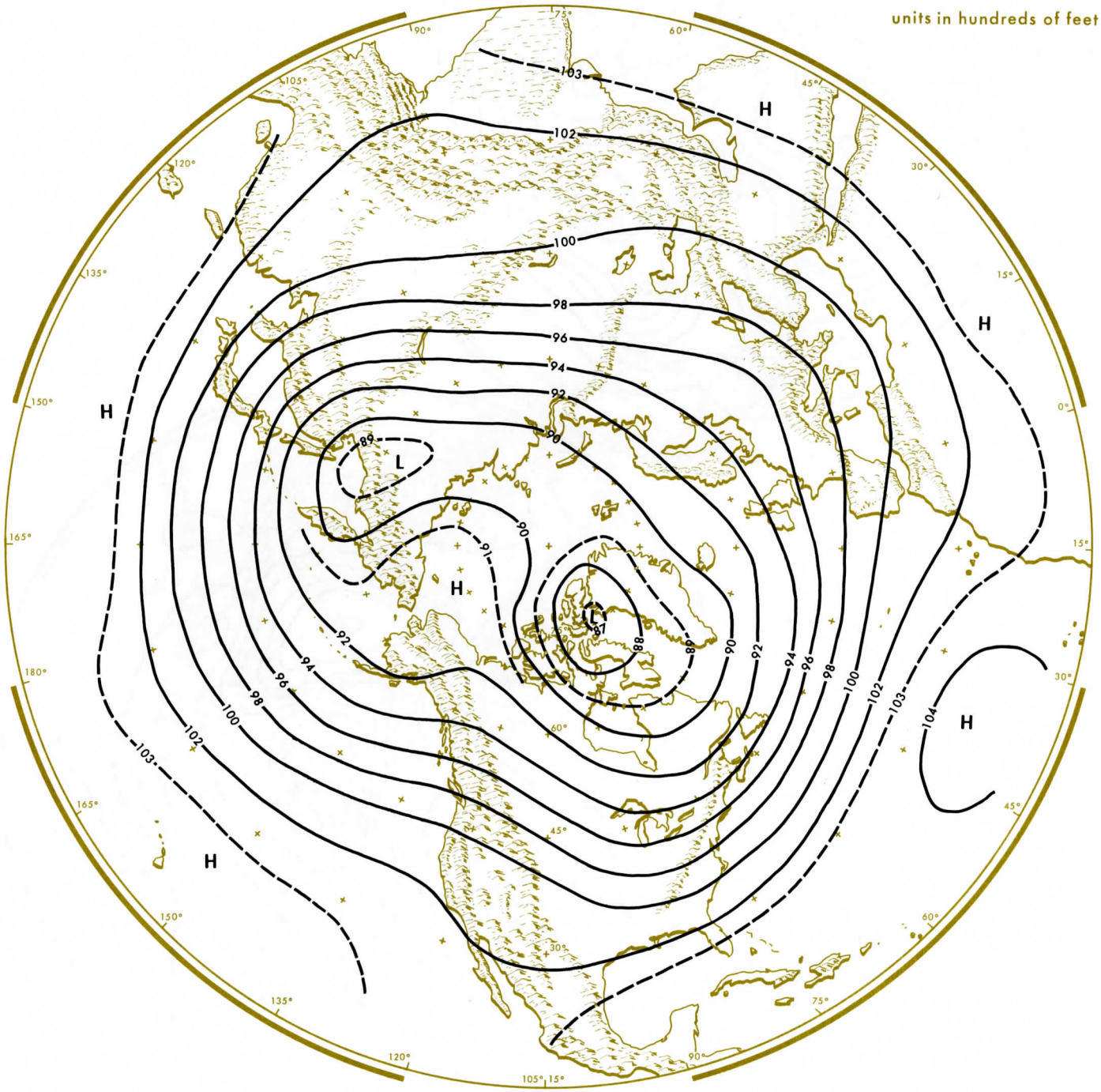
units in feet



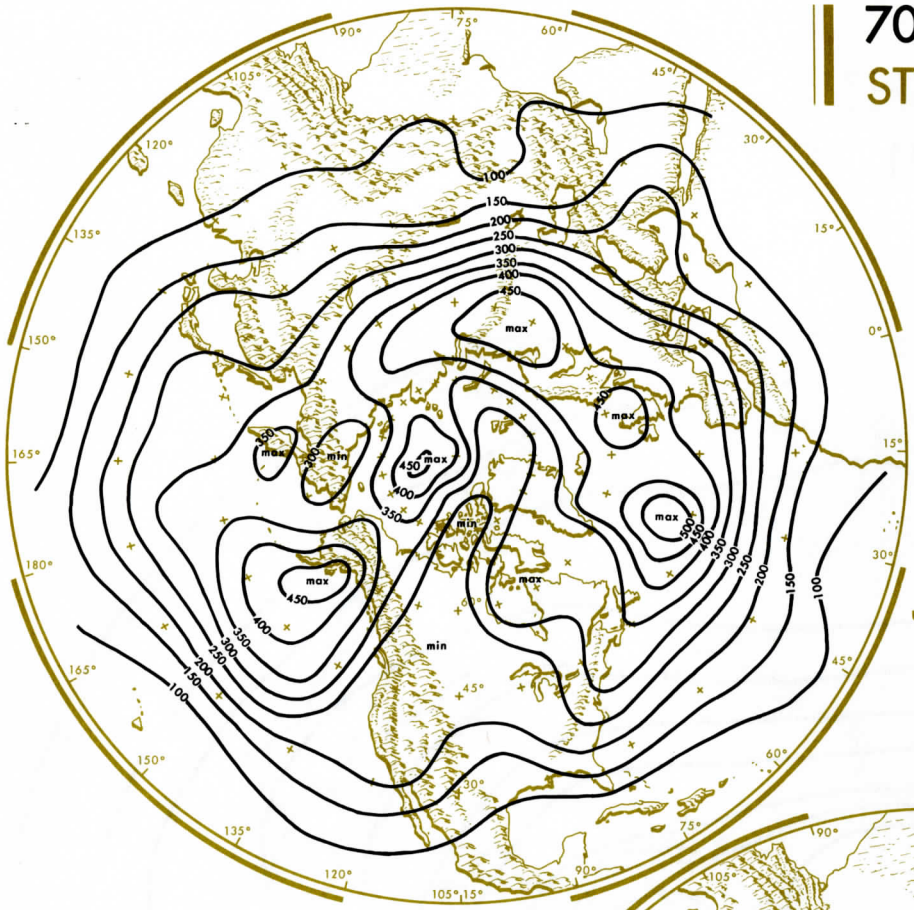
units in feet

HEIGHT CHANGE
from this period to the next five-day period

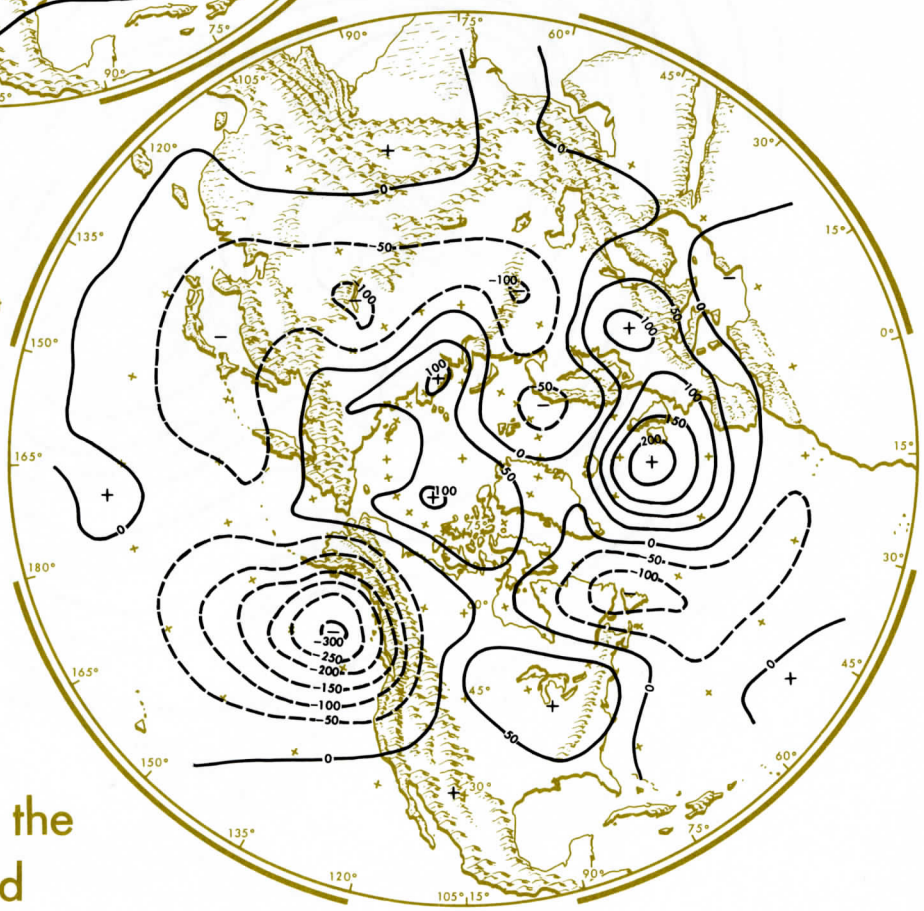
700 millibar
AVERAGE HEIGHT
December 12-16



700 millibar height
STANDARD DEVIATION



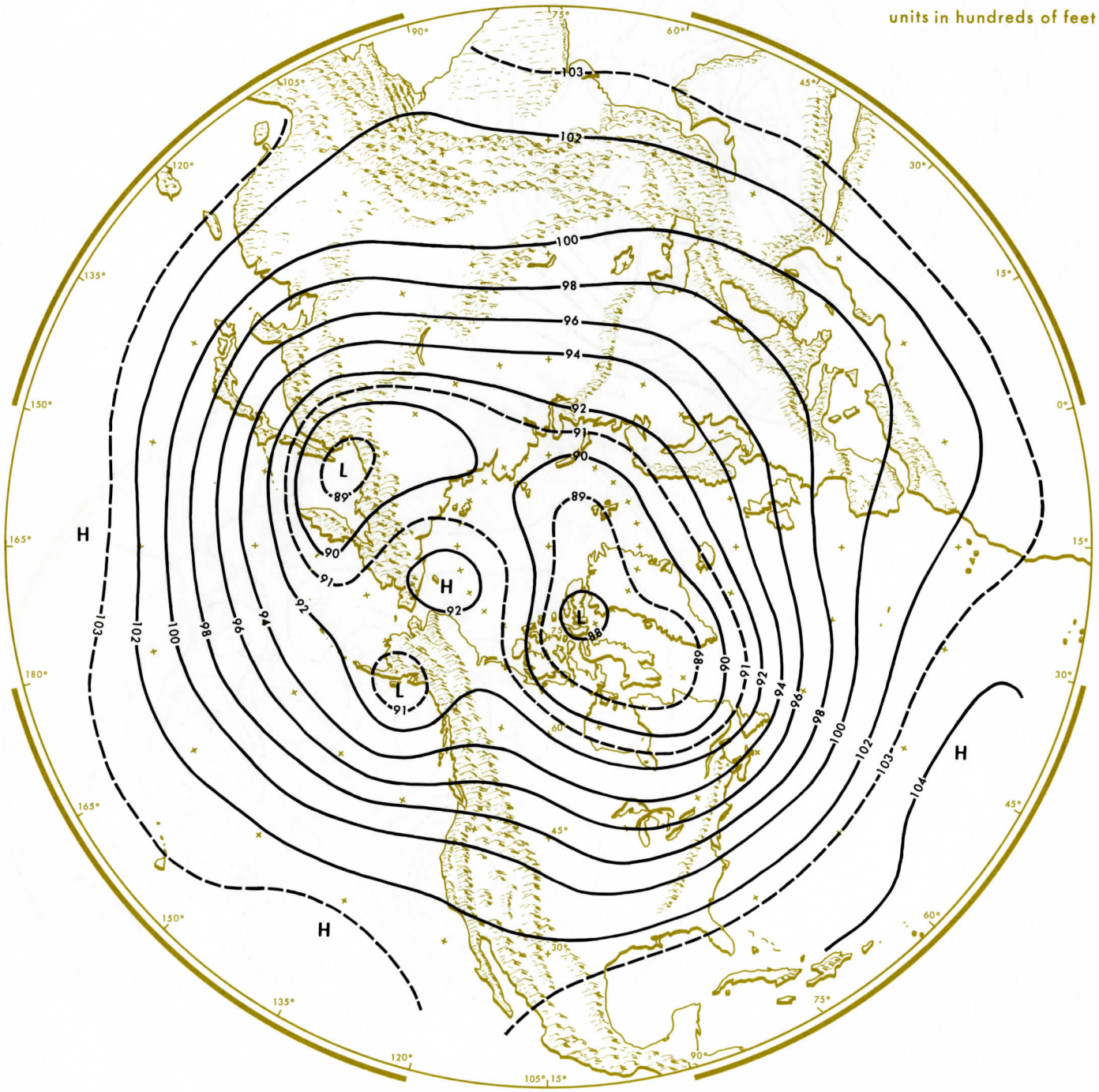
units in feet



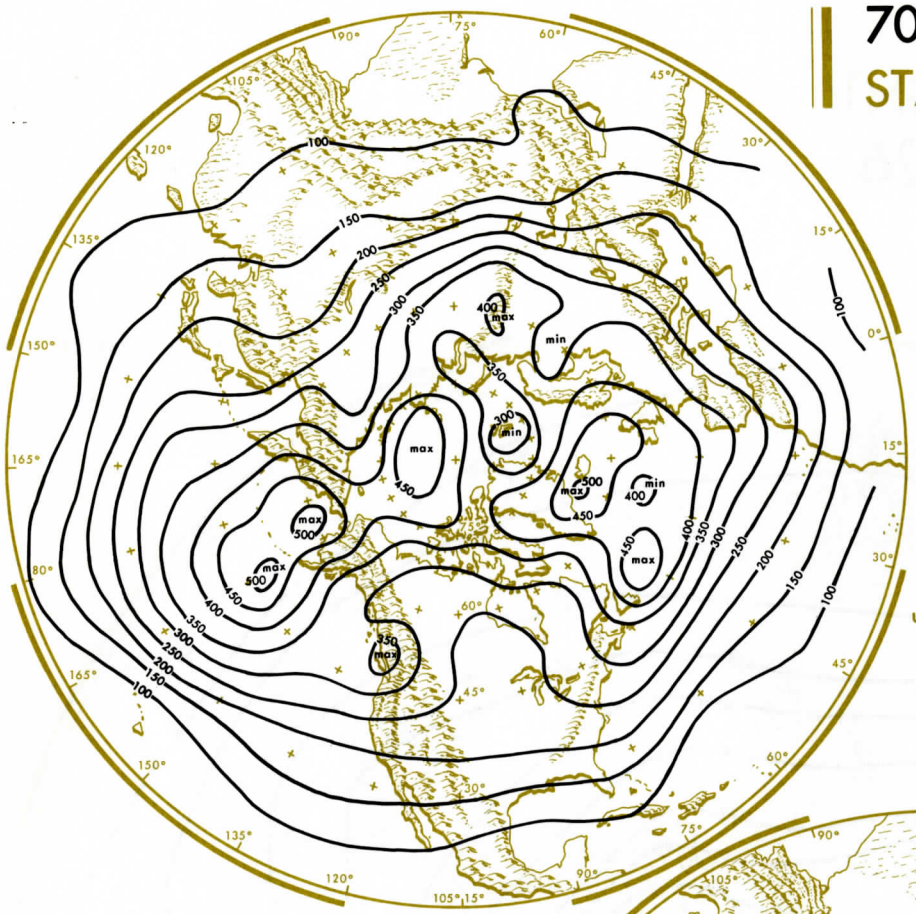
units in feet

HEIGHT CHANGE
from this period to the next five-day period

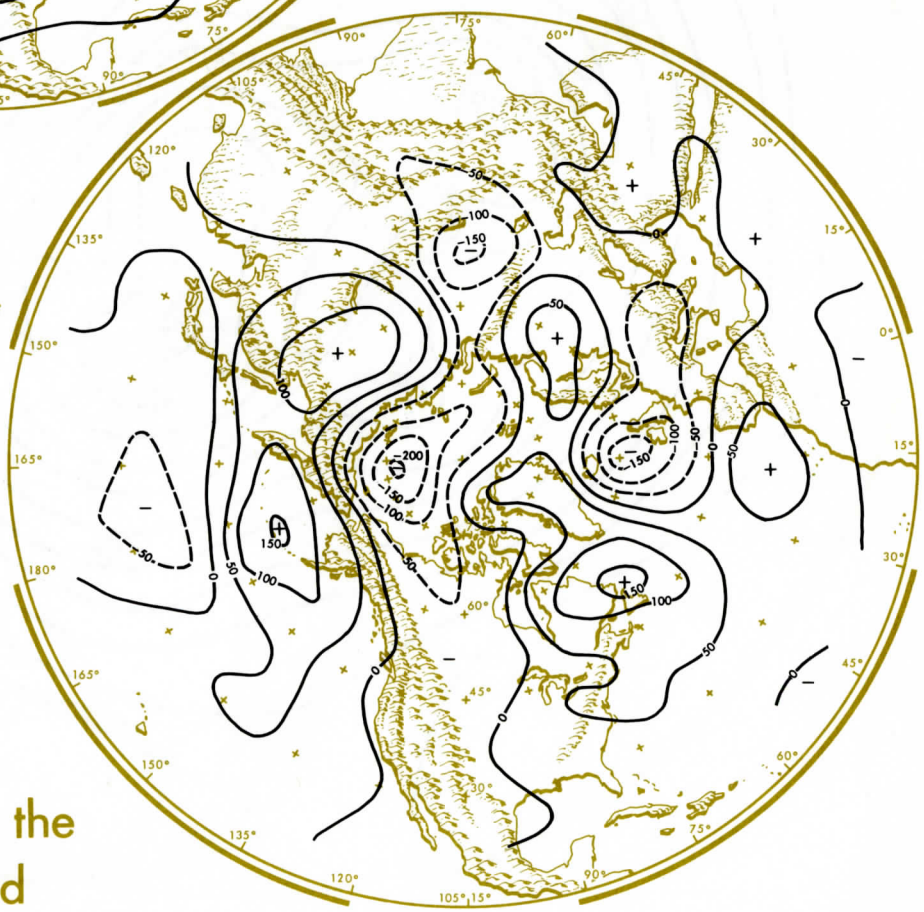
700 millibar
AVERAGE HEIGHT
December 17-21



700 millibar height
STANDARD DEVIATION



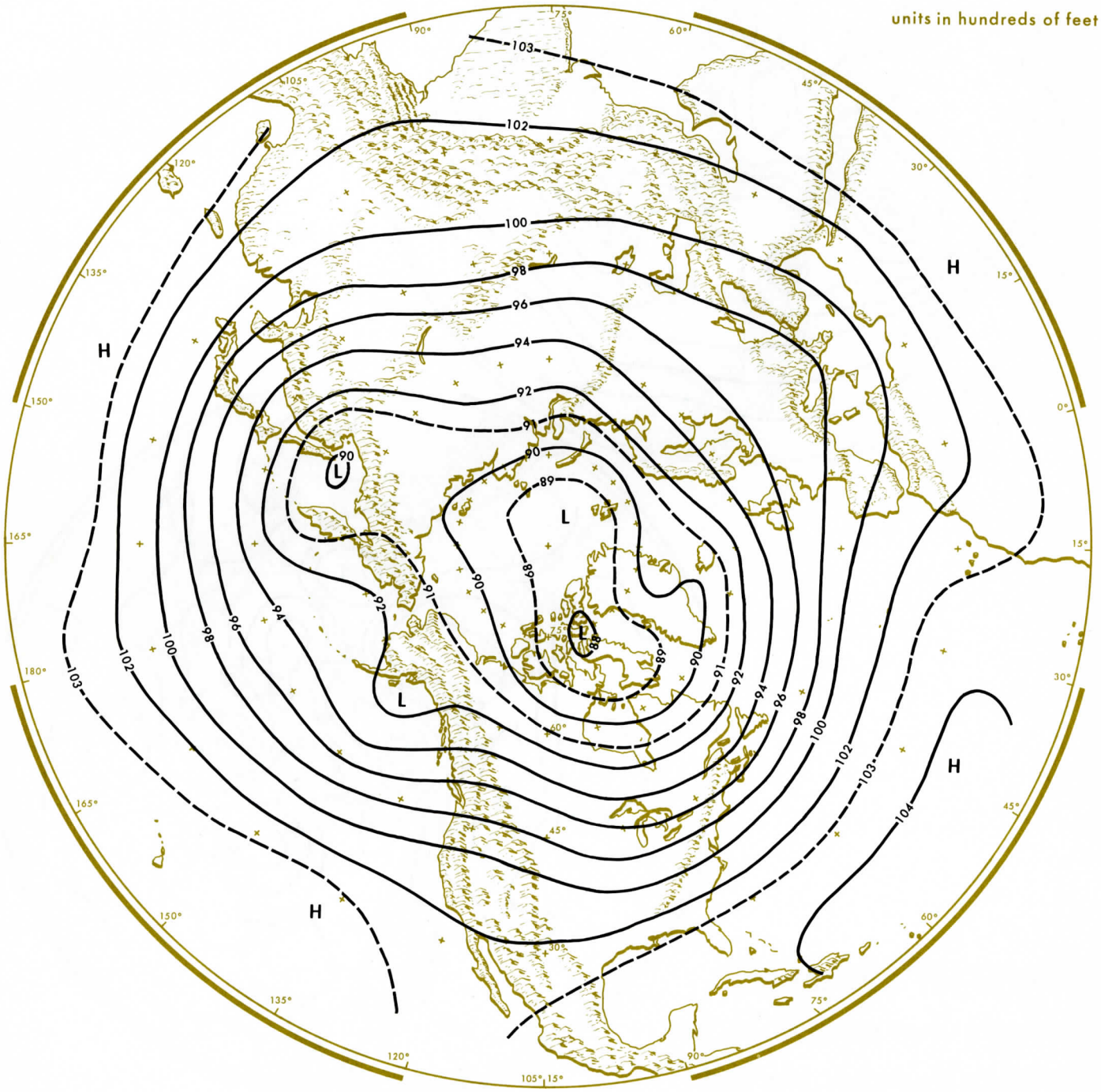
units in feet



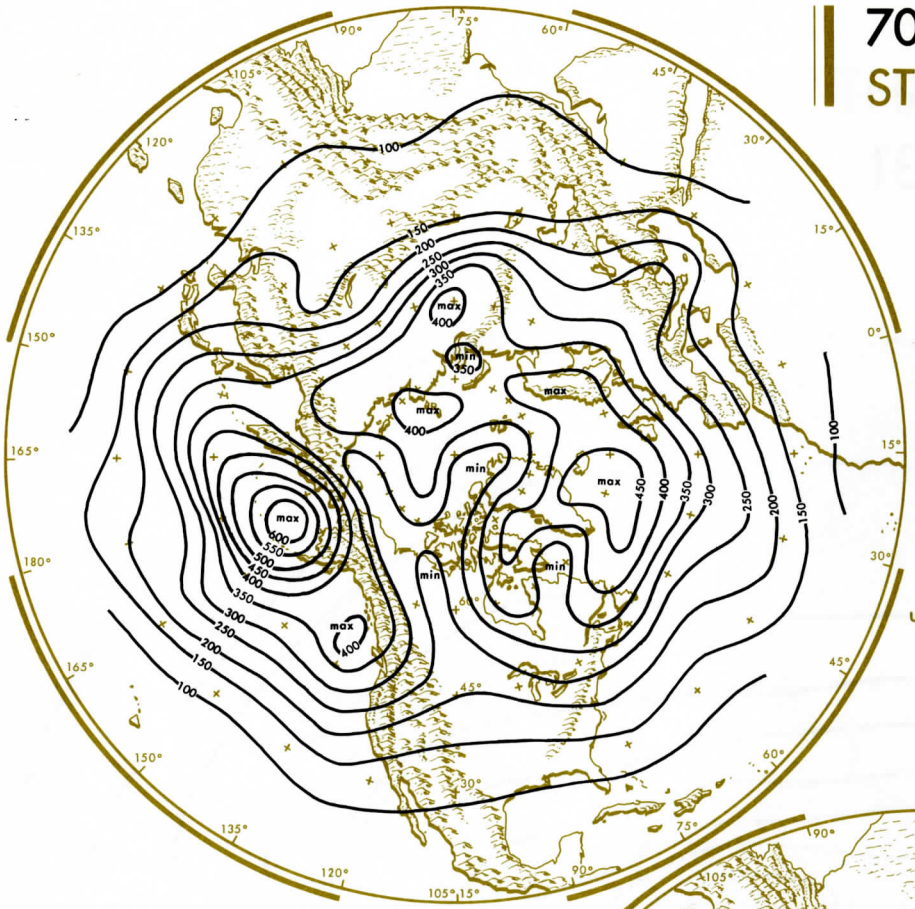
units in feet

HEIGHT CHANGE
from this period to the next five-day period

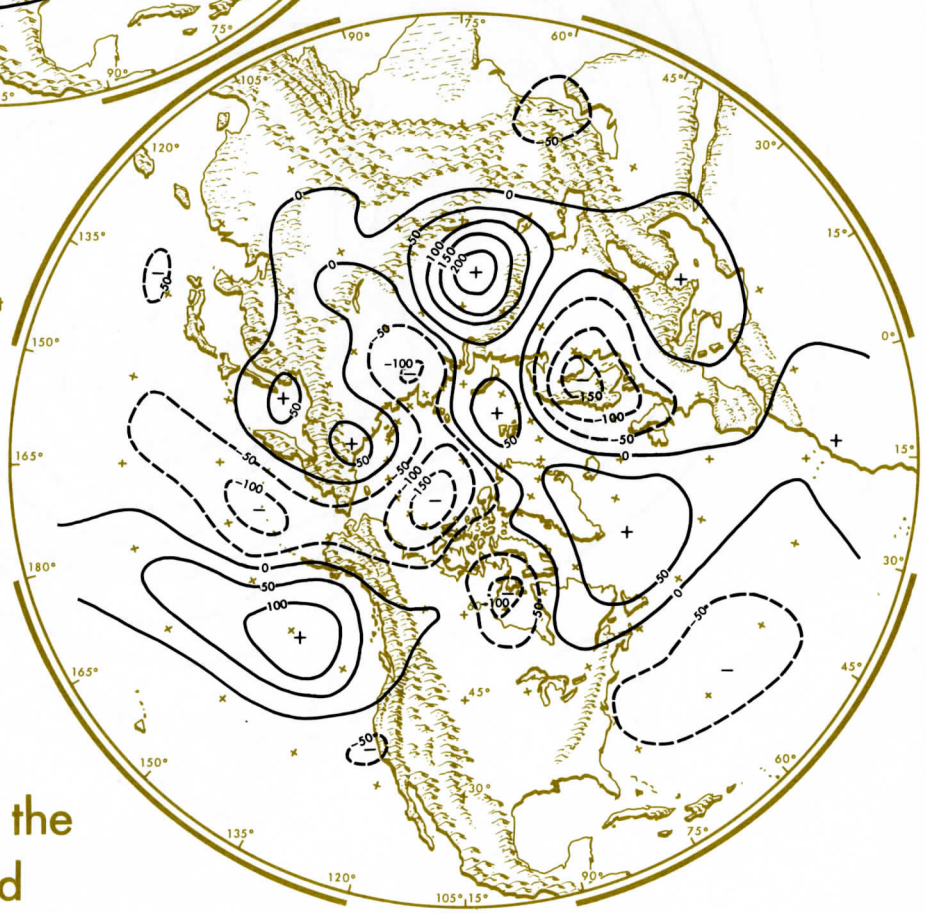
700 millibar
AVERAGE HEIGHT
December 22-26



700 millibar height
STANDARD DEVIATION



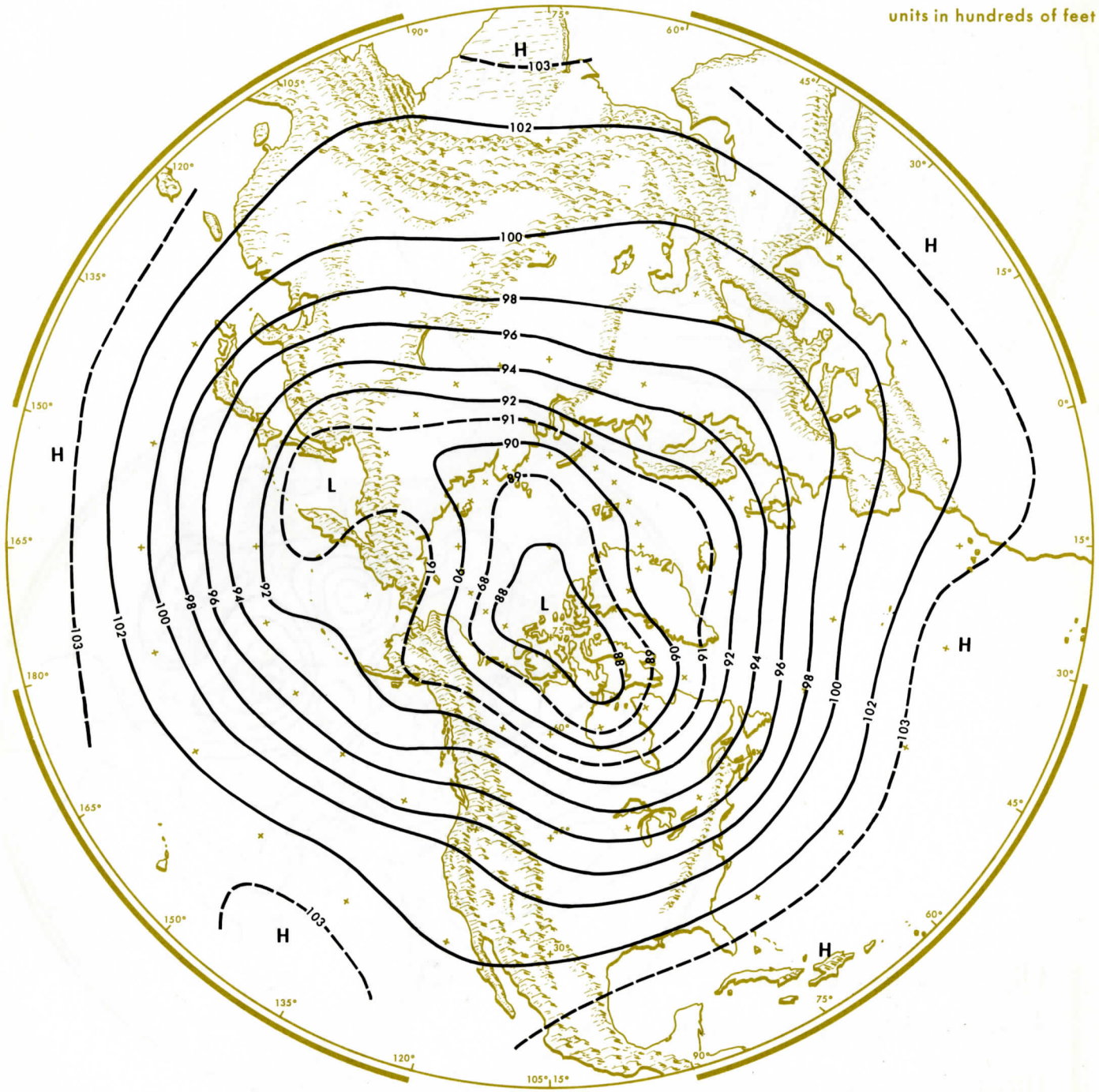
units in feet



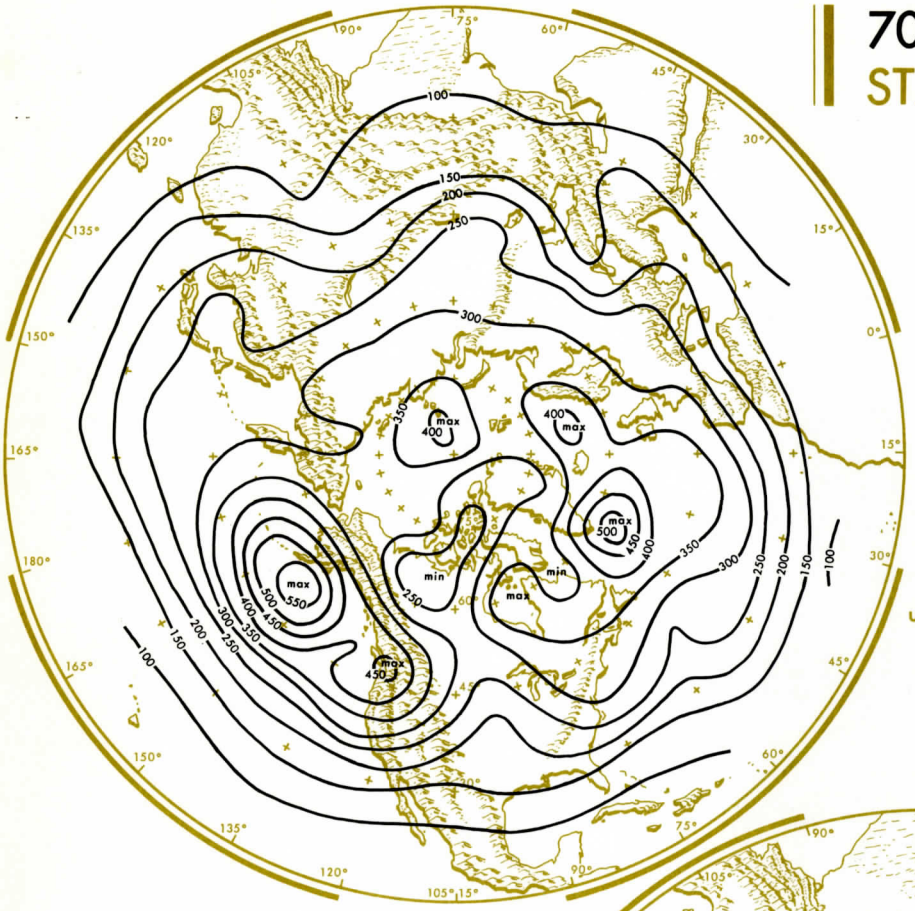
units in feet

HEIGHT CHANGE
from this period to the next five-day period

700 millibar
AVERAGE HEIGHT
December 27-31

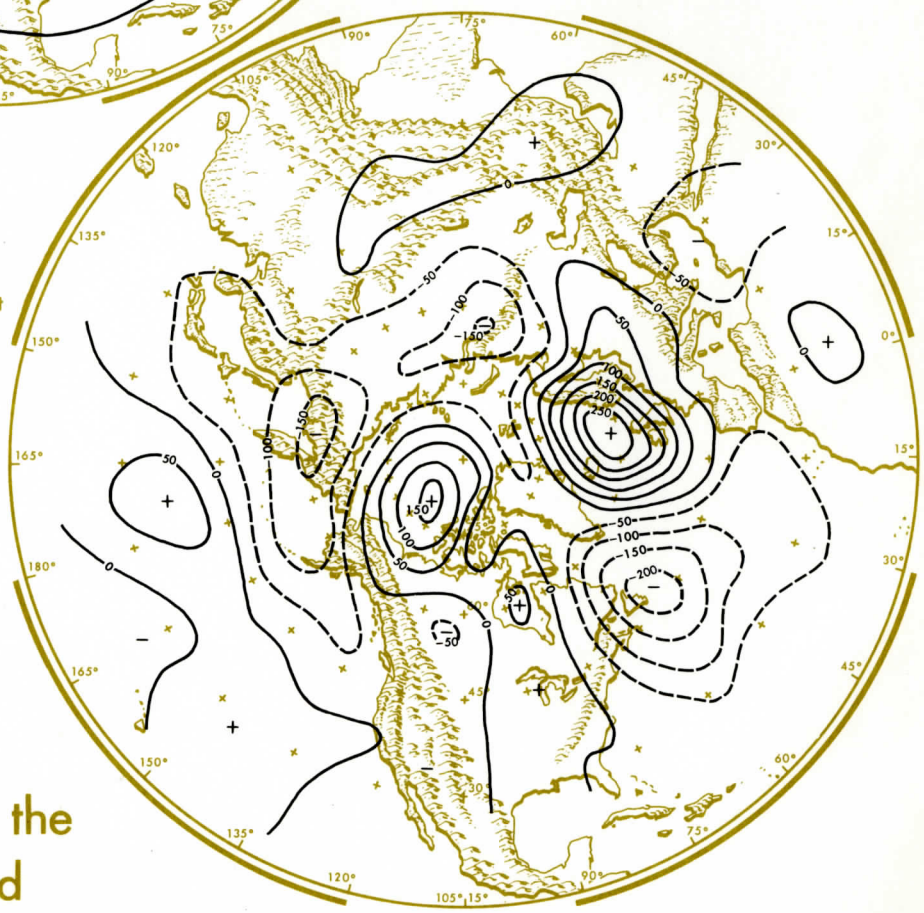


700 millibar height
STANDARD DEVIATION



units in feet

HEIGHT CHANGE
from this period to the next five-day period



units in feet