EASTERN REGION TECHNICAL ATTACHMENT #8
No. 82-05
March 15, 1982

LFM PERFORMANCE AND LONG-WAVE TROUGHS

The LFM had some very large forecast errors during January and February 1982. Most forecasters in the Eastern U.S. were led down the garden path by a model now exhibiting schizoid behavior (steadily improving performance reverting to "gosh awful"). Many a Winter Storm Watch was issued only to be cancelled as the nonevent came closer. Recent verification of the 36-hour LFM 500mb progs by NMC showed a monthly mean algebraic height error of 100 meters centered over Kentucky for February 1982. (When the verification data is received from NMC, we will attach it to a future issue of the Outlook.) This meant that the LFM was overforecasting development in the Eastern U.S. A new product has recently become available which may help to diagnose and anticipate such errors in the future.

At the request of SSD, WR, a new product has recently been added to AFOS--the 500mb wave number 0-5 chart which is produced, once daily, from the 0000Z spectral model run. The wave number 0-5 chart is similar to the old space mean ($\bar{z}$) chart and filters out short-waves with wavelengths less than 72° of longitude; therefore, the long-waves are highlighted. The AFOS designator for these charts is NMCGPH5T5.

Knowledge of the long-wave positions could be useful in evaluating the potential performance of a specific LFM run. There has been some speculation that anomalous circulation patterns at the LFM boundaries have been responsible for the poor performance of the LFM this winter. Although the LFM has active boundaries (tendencies from the previous spectral model run are applied to the LFM boundaries), the boundaries may not totally sense what is going on outside of the LFM computational grid. More importantly, if the LFM attempts to develop a short-wave trough moving into a region distant from a long-wave trough (as shown by the wave number chart), development should be played down and the motion of the surface system adjusted to a more zonal movement and less meridional. A series of wave number charts, for the past several days, should be evaluated to determine whether the long-wave positions are undergoing adjustment. This evaluation should be based on trends, or excessively large, or short wavelengths, between long-waves. Figure 1 is rather typical of the long-wave positions during January and February. Note that the long-wave troughs were off both coasts. During this period, the LFM continually showed developing systems in the Eastern U.S. only to back off in succeeding runs. The spectral model performed much better--probably because its computational grid covers the entire hemisphere. Figure 2 should be compared to Figure 1 to see the change that took place in the long-wave trough positions near the U.S. By March 5 (Fig. 2), a long-wave trough formed over the middle of the U.S. From that point on, LFM performance improved considerably in the Eastern U.S.

There is a proposal to replace the 96-hour 500mb prog in the 3-5 day package with a 108-hour 500mb wave number 0-5 prog (see Fig. 3). This could prove to be a useful adjunct to the observed wave number chart. Future trends of the long-wave troughs will be available in addition to the past trends.

(over)

In summary, the wave number 0-5 chart could be a useful tool for diagnosing LFM performance, since the LFM computational grid does not contain the entire hemispheric picture. If the LFM develops short-waves in regions distant from the long-wave trough positions, development should be played down and the system motion adjusted, accordingly.

SCIENTIFIC SERVICES DIVISION, ERH
March 15, 1982

Attachment: Figures 1-3

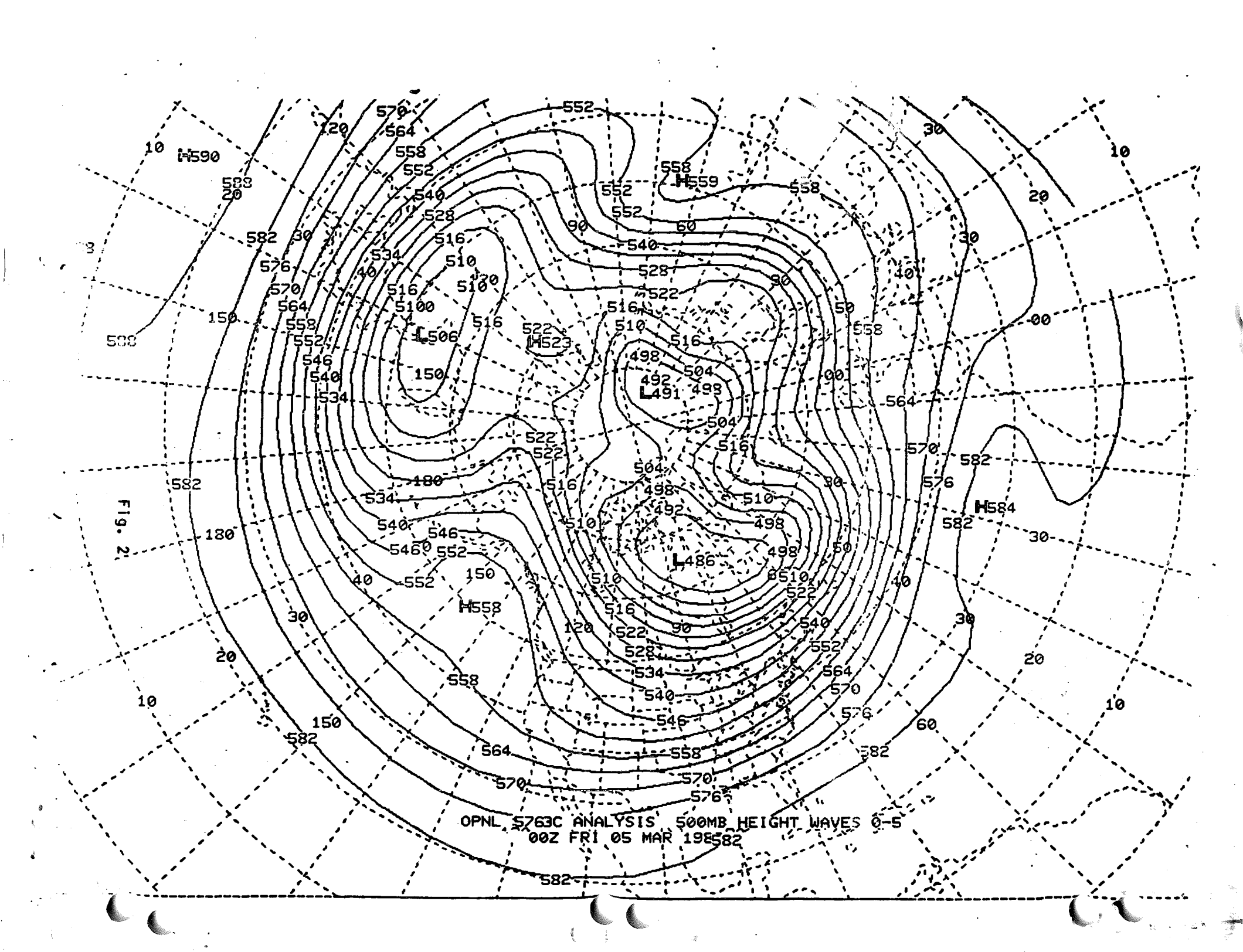
OPNL 5763C ANALYSIS 500MB HEIGHT WAVES 0-5
00Z FRI 05 MAR 1982

Fig. 2

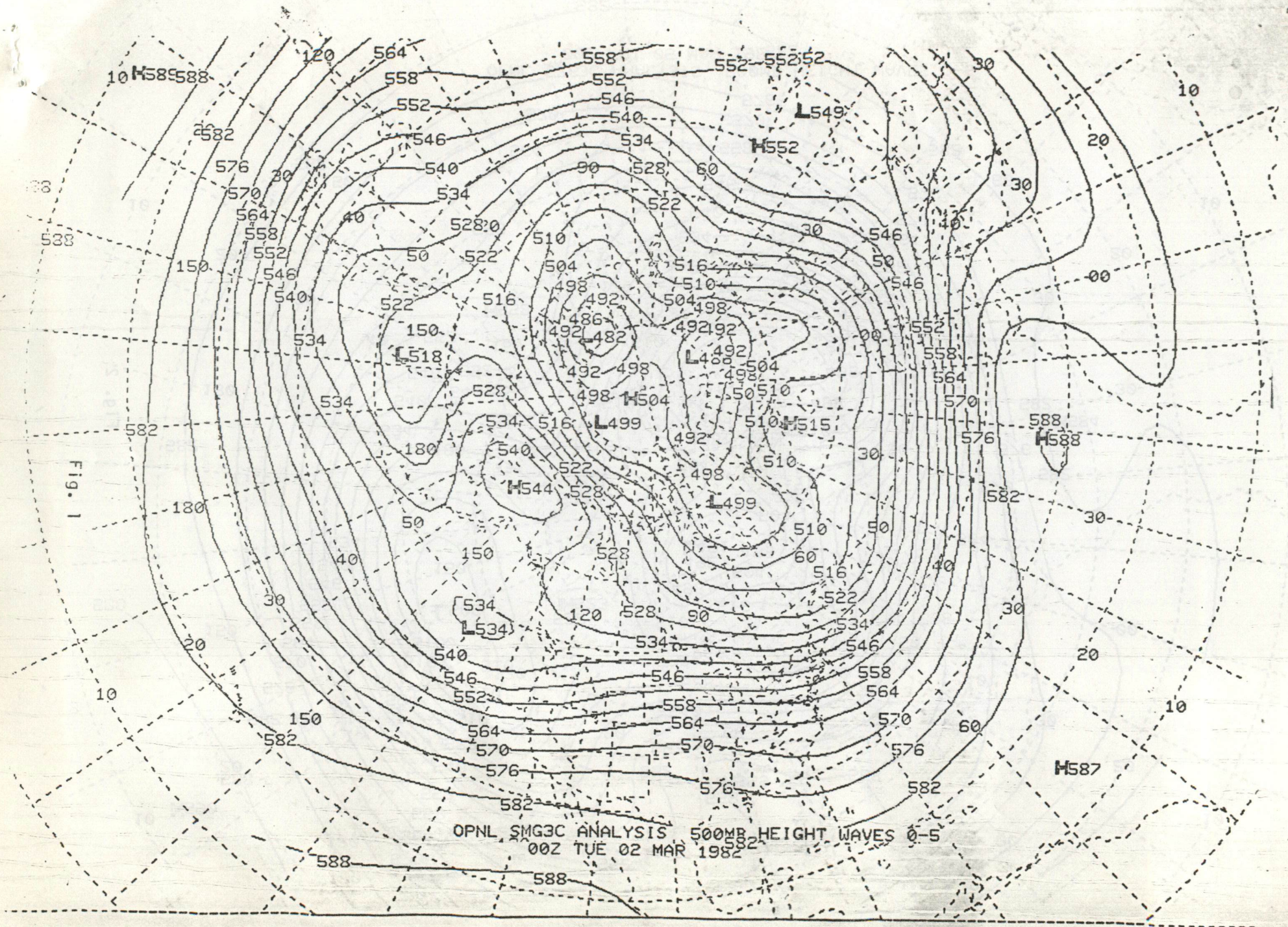
OPNL SMG3C ANALYSIS 500MB HEIGHT WAVES 0-5
00Z TUE 02 MAR 1982

Fig. 1

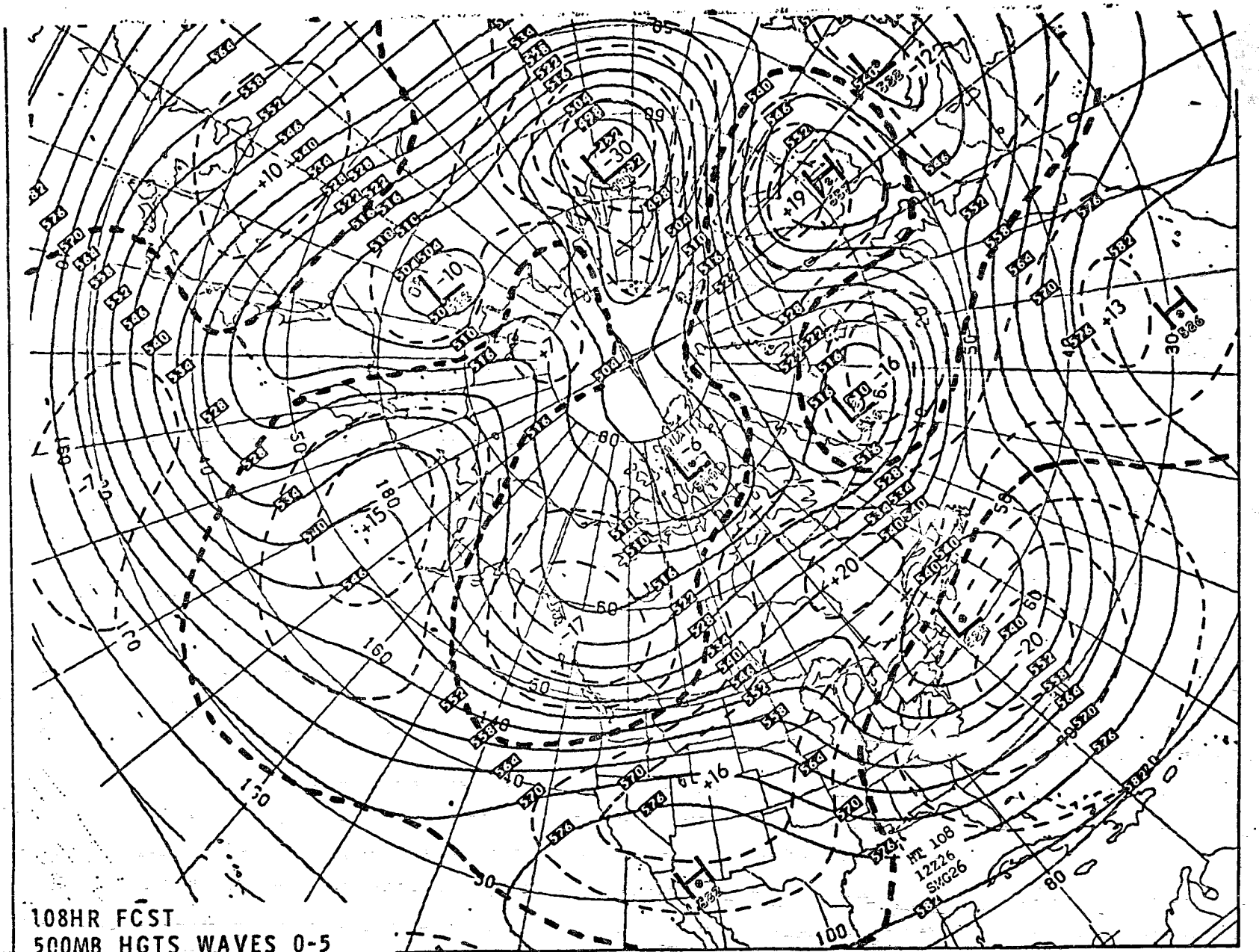
108HR FCST
500MB HGTS WAVES 0-5
FROM 00Z MON 22 FEB 1982
VALID 12Z FRI 26 FEB 1982
N.O.A.A.-NATIONAL WEATHER SERVICE
PREPARED:
TROPICAL CYCLONE POSITIONS
ARE NOT SHOWN
CONSULT LATEST ADVISORIES
HT 108
12Z26
SWG26

Fig. 3