only 8.8°C difference. Also, the spline analysis misses Amarillo, Tex. (AMA), by 6.1°C even though it appears to be a correct observation.

Figures 11 and 12 show 500-mb wind speed analyses. Although the analyst was able to fit his analysis to all reports except Peoria, Ill. (PIA), the axis of strongest winds is oriented differently on the spline analysis than on the subjective analysis. Amarillo (AMA) and El Paso, Tex. (ELP), were missed by about 9 and 15 kt, respectively.

The subjective analysis of 300-mb heights (fig. 14) accurately accounts for the large gradient defining a jet while the spline analysis (fig. 13) does not. In particular, the 257-m difference between Albuquerque, N. Mex. (ABQ), and El Paso (ELP) is shown as about 110 m on the spline analysis. The low height center is displaced by about 200 mi and for many stations the analysis does not fit the data in an acceptable manner.

Therefore, on the basis of the evidence presented, we must conclude that the spline technique as used by Fritsch is *not* a satisfactory method of two-dimensional data analysis.

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Reply

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In using an objective analysis that was *based on* the Cressman (1959) technique, it was not my intention to directly compare the actual Cressman technique (in its entirety) to the spline technique. Indeed, it was pointed out that the actual Cressman method could not be used since a preliminary forecast field was not available. It was desirable, however, to establish some type of comparison between the spline technique and the common "weighting" techniques. Apparently, the selection of mean latitudinal heights for a preliminary field (in combination with the particular size and number of data scans) placed too severe a restriction on the weighting method. In this regard, the comparison should not cast any reflection on results obtained by the explicit application of the actual Cressman method of analysis. Certainly, the everyday applications of Cressman's method serve to validate the successful operation of his technique.

With regard to the spline technique, certain persistent errors in the location and intensity of major analysis features have been identified, and the original method has been subsequently modified to adjust for these errors.

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Cressman, George P., "An Operational Objective Analysis System," *Monthly Weather Review*, Vol. 87, No. 10, Oct. **1959**, pp. 367–374.

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PICTURE OF THE MONTH

Infrared View of an Atlantic Storm

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Two previous articles (Anderson 1970, Parmenter 1971) have discussed some of the mesoscale features that can be seen in satellite infrared (IR) data. This view (fig. 1) shows a number of synoptic scale features.

This Apr. 19, 1971, nighttime ITOS 1 view shows a well-developed Low in the western Atlantic. The multi-layered frontal band extends from the center of the Low at F southward to G and then northwestward into Georgia (H). The most active portion of the front is the brighter (colder) north–south oriented cloud band about 60°W. The cloud band decreases in width and activity toward G and becomes even more disorganized toward H. Note the brighter appearing line of convective clouds along the leading edge of the front near G.

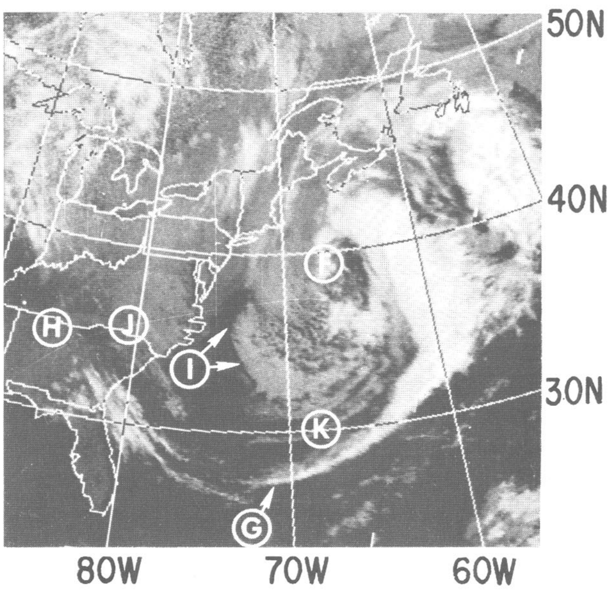

FIGURE 1.—ITOS 1 digitized infrared display, 0830 GMT, Apr. 19, 1971.

A large area of post-frontal cold-air cumulus has formed well offshore over the warmer ocean surface (I). Since these clouds have little vertical development, they appear warmer (darker gray) than most of the frontal cloudiness. These cellular clouds lie north of the fragmented and cyclonically curved cirrus clouds (J–K) that mark the jet stream. (These thin cirrus clouds are semitransparent to the outgoing warmer surface radiation. Thus, the combined response causes the clouds to appear lower than they actually are.)

A brighter cluster of cumulus clouds can be seen within the cellular field south of F. This area of enhanced cloudiness pinpoints the location of positive vorticity advection associated with a secondary vorticity center behind the front. The movement of this vorticity center toward the front has produced the increased activity along the front, mentioned above. This interaction resulted in another circulation center in this area by the next day.

The basic synoptic scale cloud features seen in video data are discernible in the IR. In addition, the IR data are very useful in delineating areas of convective activity within the large-scale cyclonic systems.

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