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Attachment #1

# A RECENT EXAMPLE OF A THUNDERSTORM OUTFLOW BOUNDARY

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*EDITOR'S NOTE: WSFOs have been encouraged to document cases where the use of mesoanalysis helped improve the forecast. The case presented here is an example of an improvement of a thunderstorm forecast based on tracking the outflow boundary from a previous thunderstorm. Better illustrations of arc clouds can be found in the literature, but as shown here, the ability to detect a less obvious outflow boundary can result in real forecast improvement.*

On June 28, 1983, the entire Ohio Valley was covered with moist unstable air and model forecasts indicated a high potential for thunderstorms. The main question for forecasters was -- when and where?

At 1100Z a moderate thunderstorm was evident on the enhanced IR satellite imagery near Evansville, IN (Fig. 1). By 1300Z (Fig. 2), sun angles were high enough that visible imagery showed low cloudiness over most of the Ohio Valley with evidence of an arc-shaped outflow boundary southeast of the Evansville thunderstorm in West Kentucky. Note also some kind of disturbance with higher cloud tops in northern Kentucky south of Cincinnati.

The 1500Z photograph (Fig. 3) showed the outflow boundary moving eastward through Kentucky as an area of clearing moving into the low cloud deck. The parent thunderstorm was, by this time, in the dissipating stage. There are no hourly reporting stations in that area of clear air. But it was assumed by forecasters that the outflow boundary would act as a trigger for release of instability, especially during the afternoon when the clear air would have been heated more than the area covered by low clouds. Extrapolation placed the outflow boundary in HTS about 22Z.

The 1800Z imagery (Fig. 4) showed an arc-shaped line of low clouds in the location where extrapolation placed the earlier outflow boundary. By 1900Z (Fig. 5) the northern end of this line had reached the pre-existing disturbance in northern Kentucky with convection beginning at the point of intersection southeast of Cincinnati.

Inflow to the developing thunderstorm has begun to dissipate the old outflow boundary. The new thunderstorm moved eastward into the HTS and CRW areas, arriving (Fig. 6) at the times indicated 4 to 6 hours earlier by extrapolation of the old outflow boundary.

Public and Aviation forecasts issued during the morning had called for general development of scattered thunderstorms. As the development became better defined on the satellite photographs, more specific information was included in the 1900Z public forecasts and in the 22Z aviation forecasts. Hourly Nowcasts issued on NWR after 1900Z also contained the more specific information.

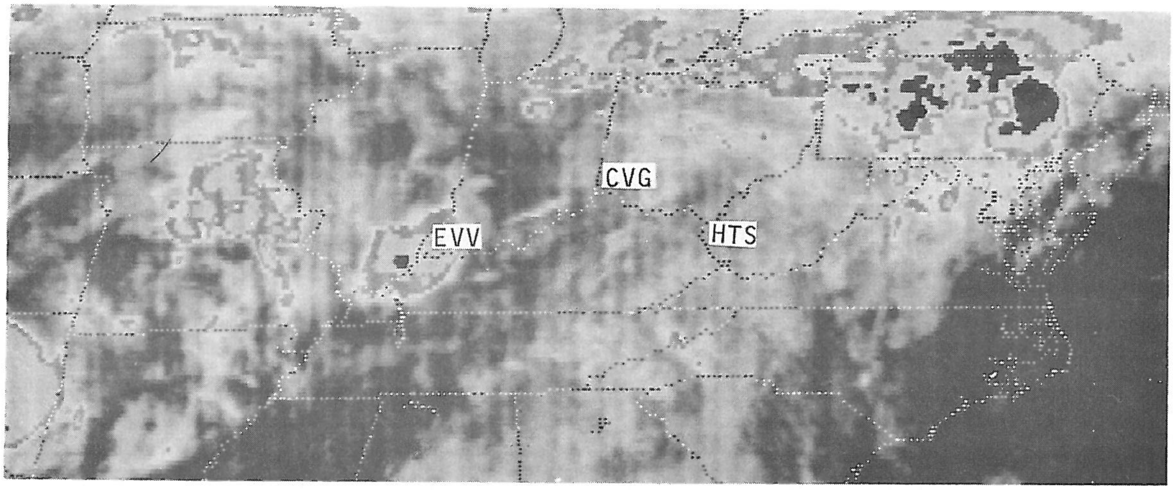


Figure 1. Infrared imagery, 1100Z, 6/28/83.

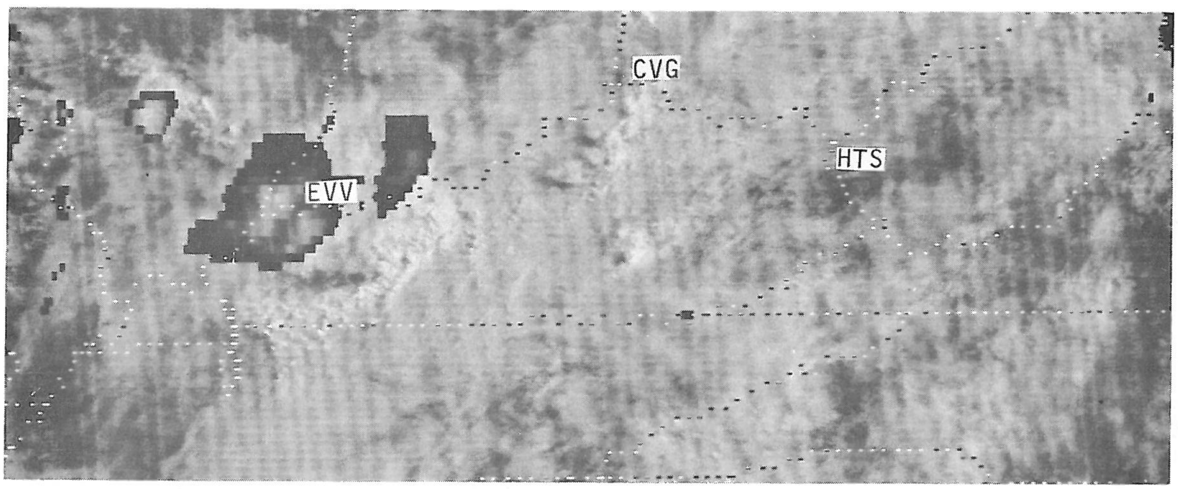


Figure 2. Visible/IR imagery, 1300z, 6/28/83

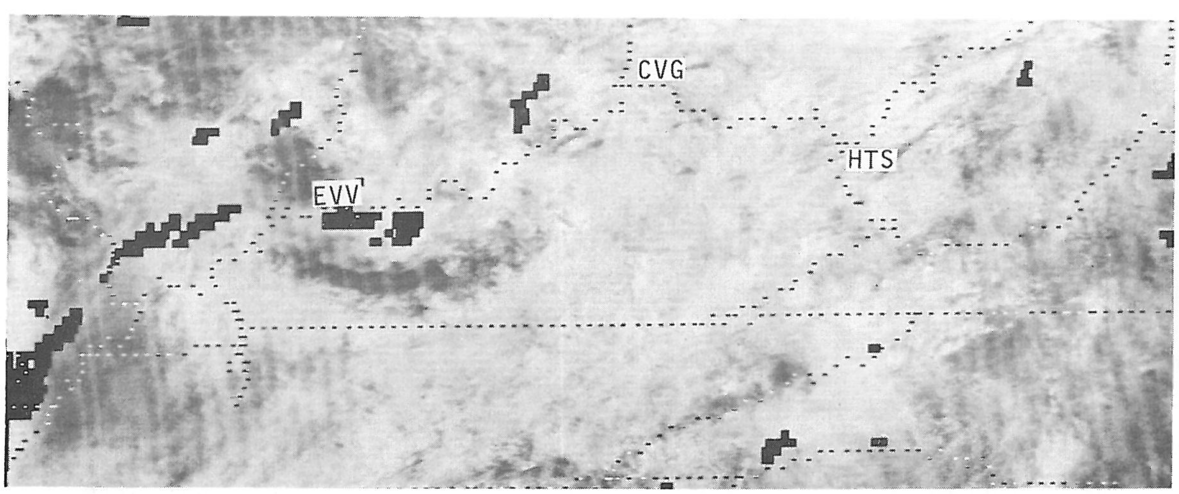


Figure 3. Visible/IR imagery, 1500Z, 6/28/83

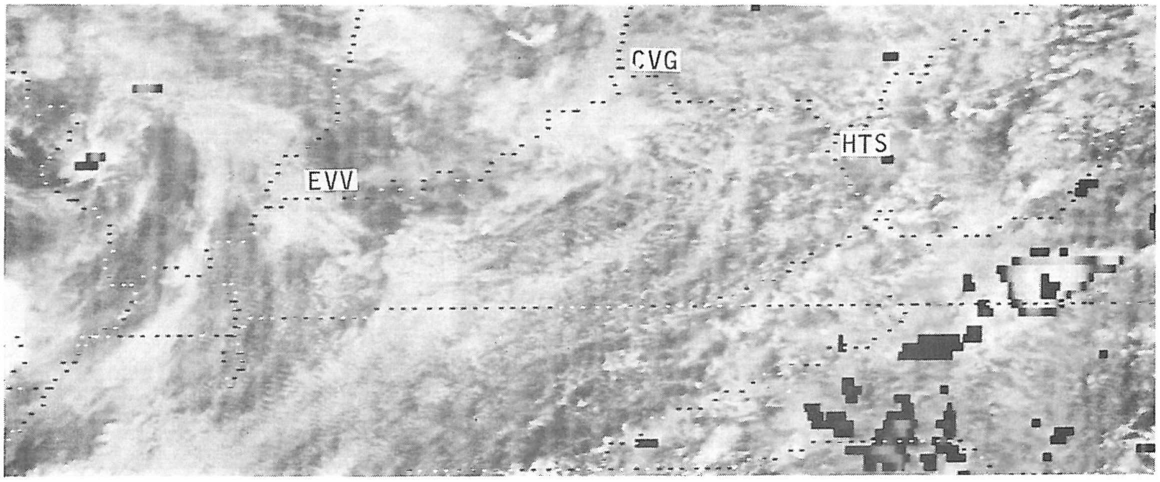


Figure 4. Visible/IR imagery, 1800Z, 6/28/83

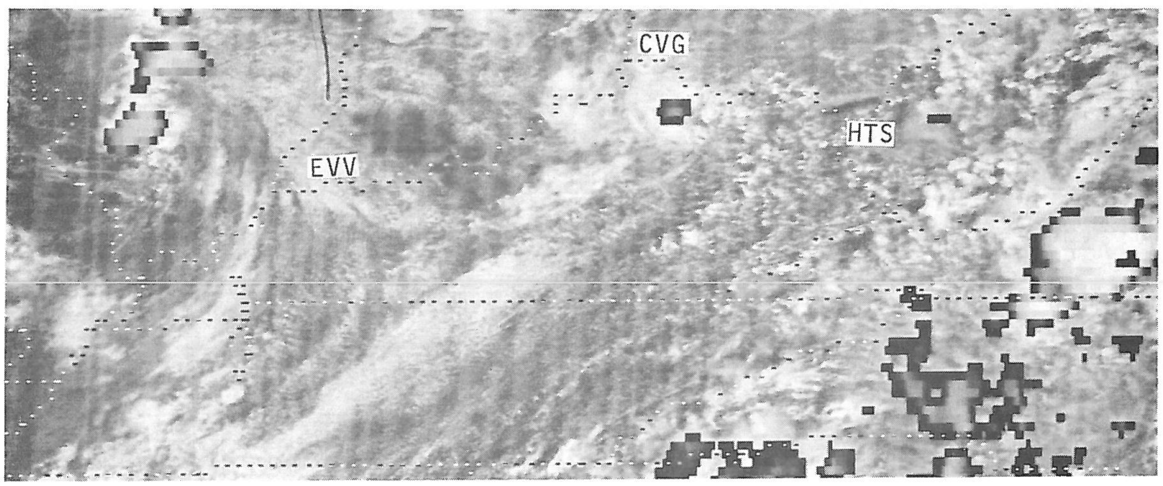


Figure 5. Visible/IR imagery, 1900Z, 6/28/83

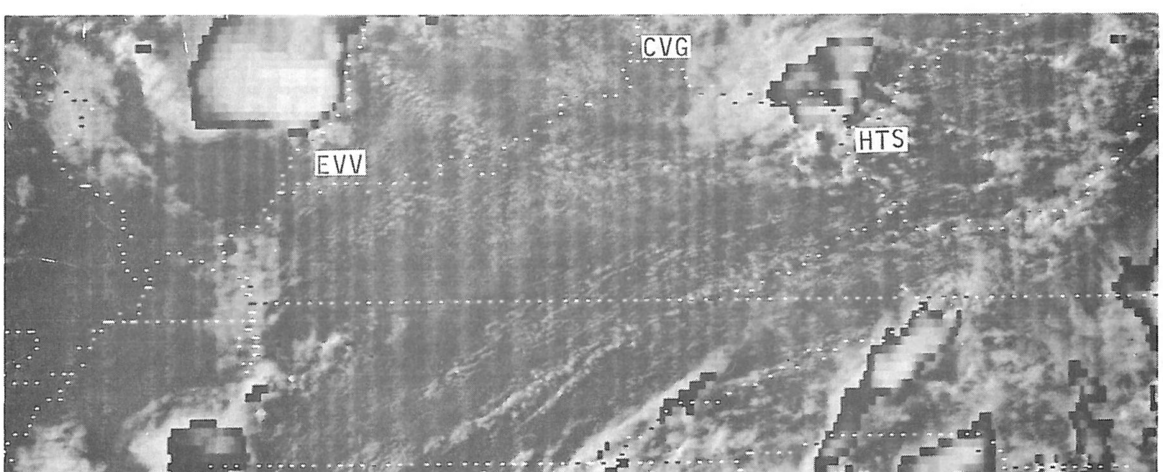


Figure 6. Visible/IR imagery, 2200Z, 6/28/83