PICTURE OF THE MONTH

Cirrus and Upslope Cloud Patterns

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The simultaneous acquisition of visible and infrared (IR) data by the NOAA-2 satellite is a valuable tool in the operational interpretation of satellite imagery. These two views were taken by the NOAA-2 Very High Resolution Radiometers (VHRR) at 1658 GMT 9 March 1973. Fig. 1, the visible data, shows a large

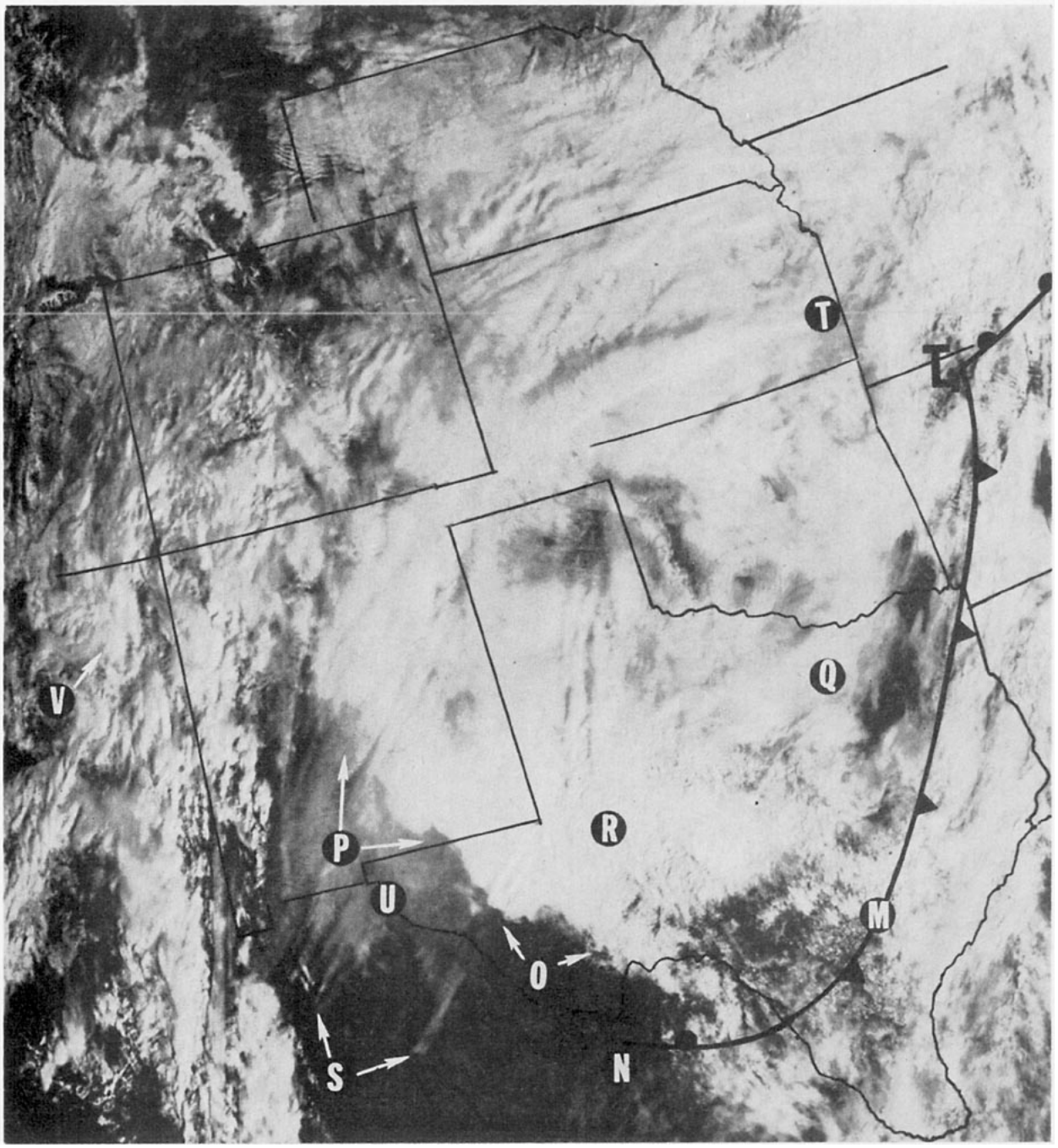

FIG. 1. NOAA-2 VHRR visible (1815-15) 1658 GMT 9 March 1973.

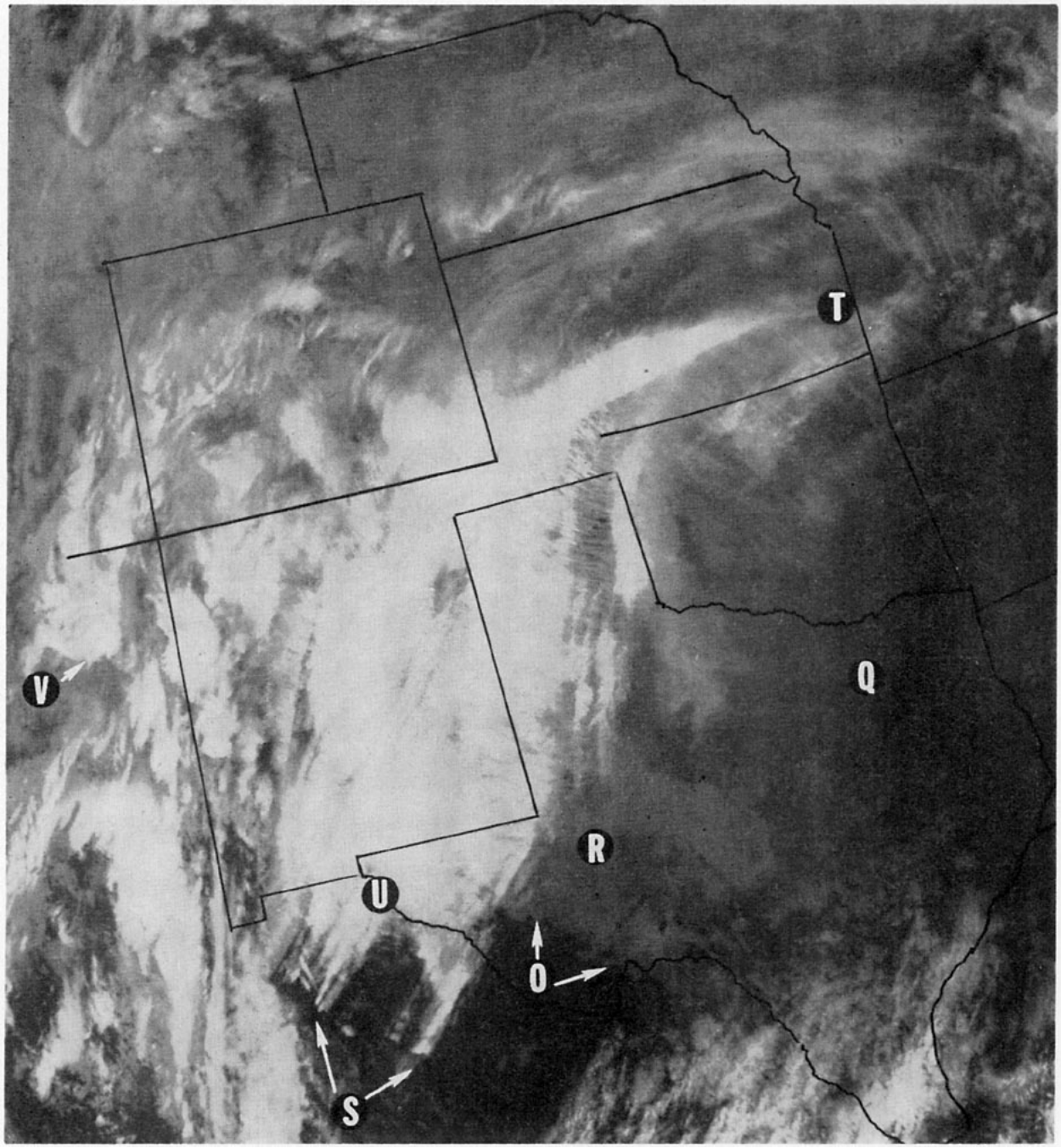

FIG. 2. NOAA-2 VHRR-IR (1815-7) 1658 GMT 9 March 1973.

area of cloudiness covering most of the Plains states. The IR data, Fig. 2, provides additional information about the height and convective nature of this cloudiness.

On this day a surface ridge extended from the Oklahoma panhandle northward through Omaha into S.E. Ontario; while farther south a stationary front extended from Kentucky to a low center in northwest Arkansas, Fig. 3. At 500 mb, a closed low was positioned over the Gulf of California with a ridge overlying the Texas–New Mexico area.

The IR data, Fig. 2, shows that much of the cloud cover seen in the visible channel is warm, low clouds and fog. The relatively inactive stationary front is located along the edge of the low clouds at (L-M) and then stretches westward into Mexico (N), Fig. 1.

The presence of a ridge aloft coupled with persistent easterly and southeasterly low level flow against the mountains has produced a large area of upslope cloudiness from Texas northward into Nebraska. This is best seen in the visible image where the clouds cover most of the area, but terminate abruptly along the eastern edge

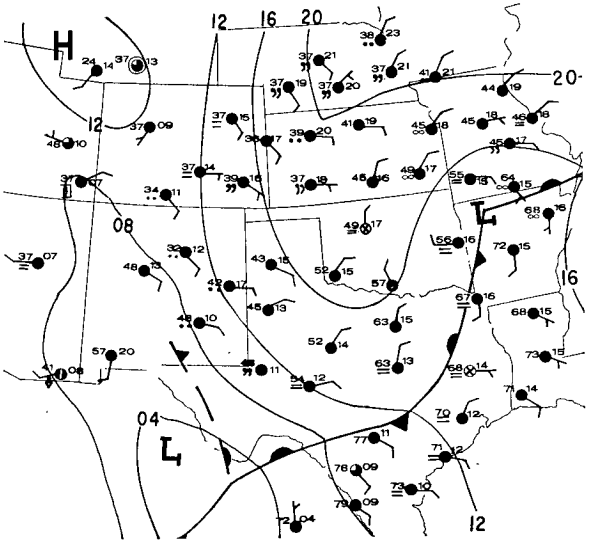

FIG. 3. Surface map, 1800 GMT 9 March 1973.

of the Santiago and Davis mountains in southwest Texas (O) and northward along the Guadalupe and Sacramento Range in New Mexico (P). The IR data indicates that cloud tops in northeastern Texas (Q), are lower and warmer than those near the orographic barrier (R). Here a second higher layer of clouds is present and is responsible for the small shadows that appear in the visible data around (R). The 1200 GMT radiosonde data indicates cloud tops at 990 m (+15C) at (Q) and 1670 m (+9.8C) at (R). Rain and drizzle were reported through eastern New Mexico and Colorado.

Another orographic effect can be seen at (S), Fig. 2. Here the cirrus clouds, that mark the southwesterly flow aloft into the ridge, form downwind of the Sierra Madre Mountains (S), and extend into Kansas and Missouri (T). This cirrus over El Paso (U) appears quite transparent in the visible, but the sounding showed it to be at least 90 m thick (7,185 to 7,275 m).

Convective cloudiness (such as V) in Arizona, Colorado, and Utah are easily identified in the IR data. These clouds that stretch southward into Mexico are immediately to the east of the mid-tropospheric trough.

Comparison of the cloud imagery in these two photos clearly shows the usefulness of simultaneous high resolution IR and visible imagery to quickly identify the processes responsible for the clouds. With the launch of a geostationary satellite, GOES in 1974, continuous daytime IR and visible coverage will be available to the meteorologists for operational use at designated WSFO's.