

PICTURE OF THE MONTH

Cirrus Cloud Trail

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On Apr. 30, 1969, a large area of convective clouds formed in the western Gulf of Mexico. During the succeeding days, this cloud mass alternatively strengthened and weakened as it moved eastward over Florida and then over the Atlantic Ocean. By May 4, the cloud mass was centered just east of the Bahamas. Subsequent rapid

development of this system generated a large area of cirrus along the poleward side of the cloud mass. Twenty-four hours later, the effect of the upper level wind pattern and rapid northeastward movement of the system caused this cirriform cloud area to form into the long cloud trail or plume configuration seen in figure 1.

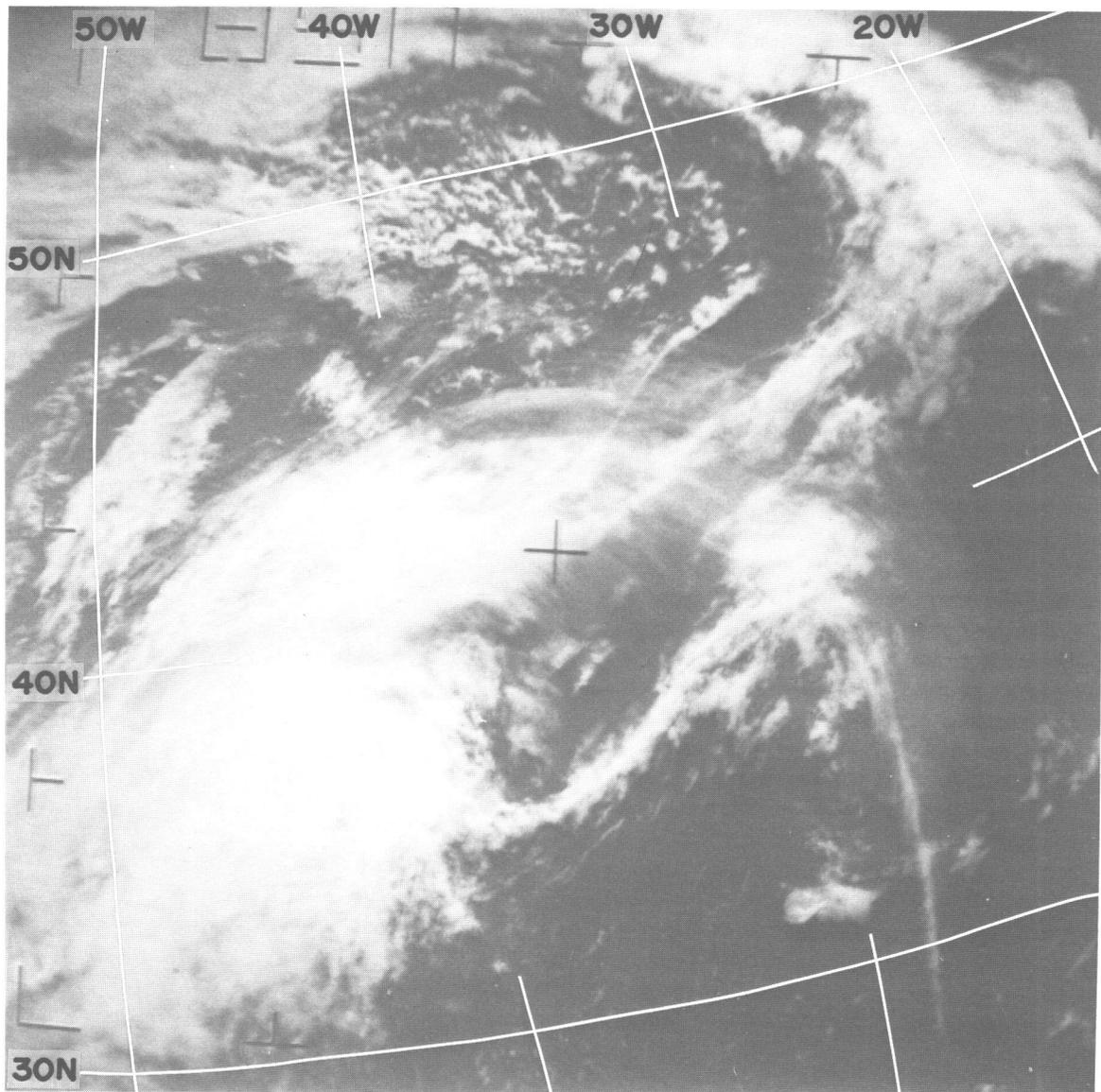


FIGURE 1.—Atlantic cirrus plume, ESSA 8, 1208 GMT on May 6, 1969.

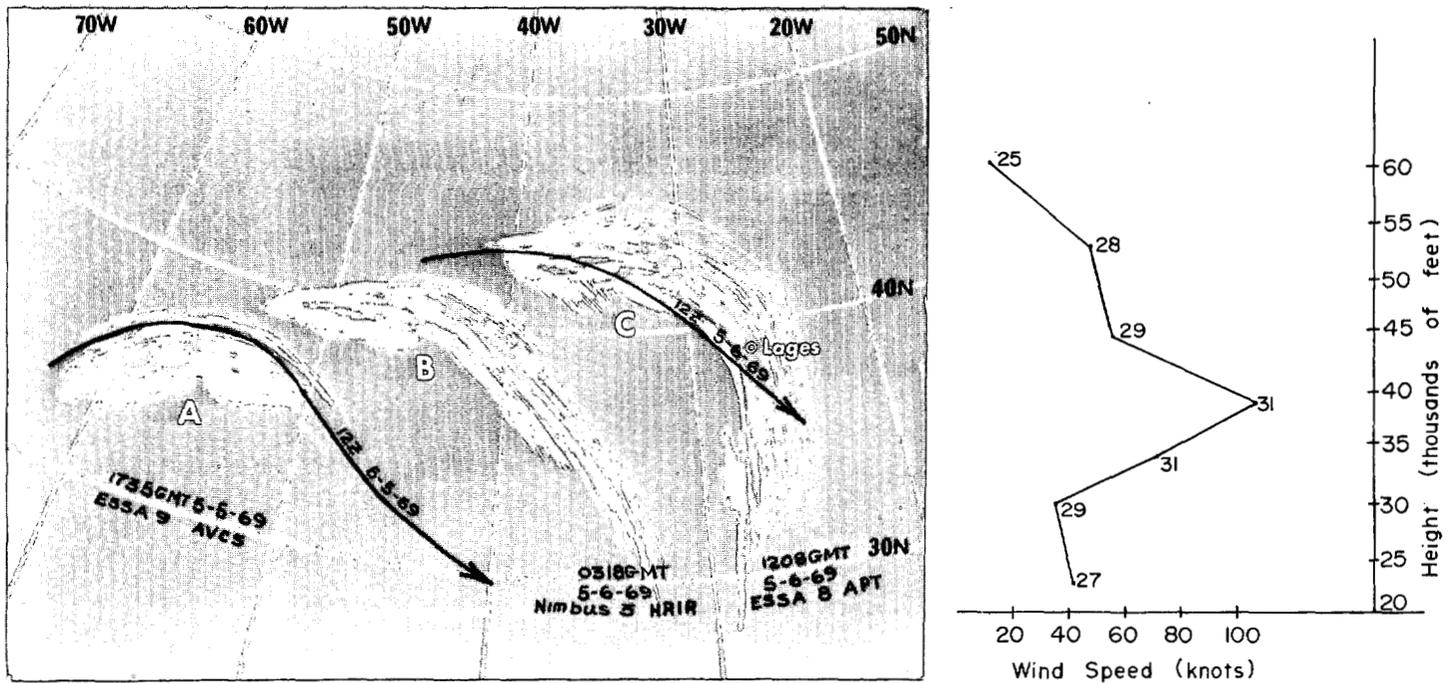


FIGURE 2.—Schematic showing cirrus cloud positions, 200-mb jet stream, and wind profile from Lajes in the Azores.

Figure 2 is a schematic showing three positions of the cirrus cloud area and the 1200 GMT 200-mb jet-stream positions for May 5 and 6. These cloud positions illustrated here were obtained from (A) ESSA 9 at 1735 GMT on May 5, (B) Nimbus III at 0318 GMT on May 6, and (C) ESSA 8 at 1206 GMT on May 6. (ATS-3 pictures were consulted for continuity for the period between positions B and C.)

It is thought that this trail is a result of the strong 200-mb wind field acting on the cirrus clouds. In the first position (A), the cirrus is concentrated along the equatorward side of the jet axis. The wind, along the western edge of the cirrus field, exceeds 100 kt from the west and then quickly changes to northwest and gradually decreases to 80 kt at 30° N. Under the influence of this average 90-kt wind regime for nearly 9 hr, the advected cirrus tends to form the arc-shaped cloud pattern seen at B. Between the time of the Nimbus view (B) and that of ESSA 8 (C), the northern part of the storm where the clouds were being

generated moved rapidly toward the northeast. The cirrus forming the southern portion of the pattern had a slower eastward component of motion and lagged behind. This slower motion caused the cloud trail to assume the north-south orientation seen at (C) in figure 1. Observations from the ATS-3 satellite on May 6 show that this cloud trail appeared to decrease slightly in length during the day. The following day, the main cloud mass had moved north, and the cirrus cloud trail was no longer visible.

The wind profile (fig. 2) at Lajes, taken at 1200 GMT on May 6, indicates the strongest winds are from 310° at 200 mb and cross the cloud trail at a considerable angle. In this example, the configuration of the cirrus field does not represent the instantaneous wind field. Instead, this cirrus cloud-trail configuration is produced by a moving cirrus-generating source. The cloud trail persists long enough to be advected away from the source and to be deformed by the relative motion of the environmental wind field.