PICTURE OF THE MONTH

Rapid Frontal Wave Development

EDWARD C. JOHNSTON

NESS Satellite Field Services Station, Coral Gables, Fla. 33124

20 August 1974

On 17 May 1974, the first geostationary weather satellite capable of continuous 24-hr surveillance was launched from Cape Canaveral, Fla. This satellite, referred to as SMS-1 (Synchronous Meteorological Satellite No. 1), was placed in a position 35,900 km above the equator at 45W. Soon thereafter the satellite began transmission of both visible and infrared (IR) data on a continuous basis both by day and by night.

One of the dramatic events recorded during the initial stages of the nighttime acquisition of full-disc IR pictures was the very rapid 12-hr development of a frontal wave over the northern Atlantic Ocean on 12 June 1974.

The four-picture sequence included here illustrates, at 4-hr intervals, how this disturbance progressed through its life cycle in such a short time. Observance of this phenomenon would not have been possible before the nighttime coverage provided by SMS-1.

On the first picture of the sequence (Fig. 1a), taken at 0021 GMT 12 June, we can see the first hint of development along the frontal system. The initial broadening of the cloud band, a typical characteristic of wave formation along a front, is apparent between about 33N and 42N.

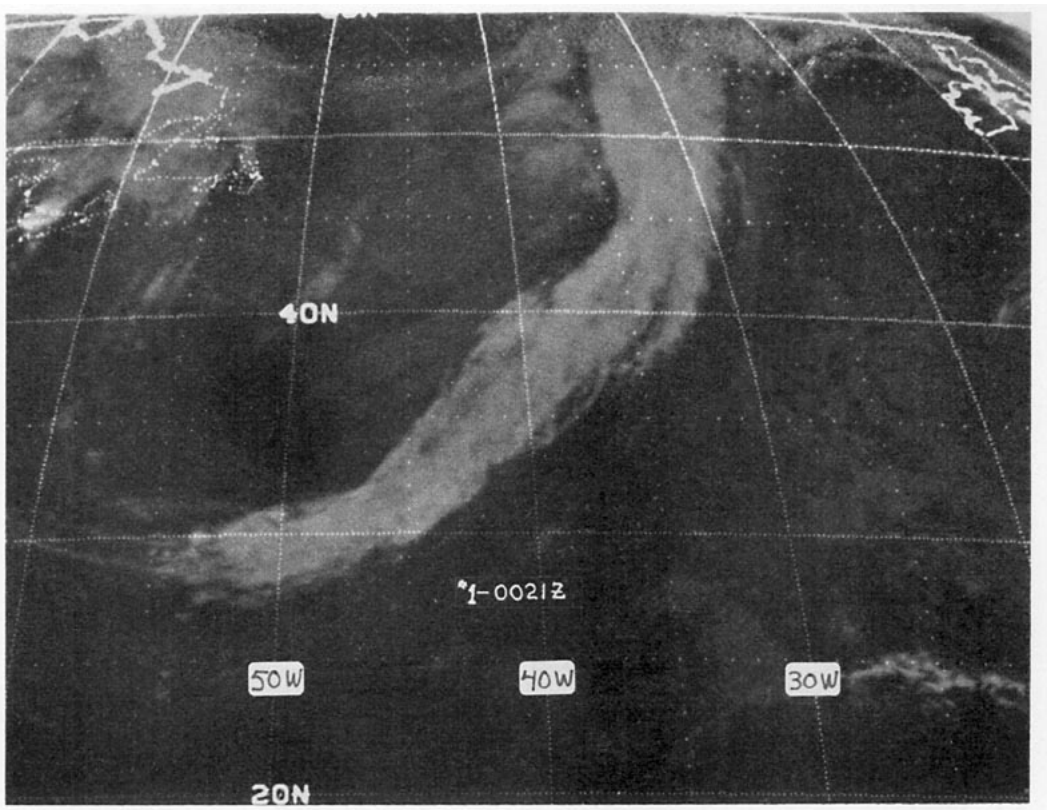
Definite intensification is evident in Fig. 1b, taken at 0420 GMT. The initial intrusion of dry air into the system can be seen along 33N as the cyclone begins to take shape. Note the contrast between the grayer, lower clouds on either side of the system, and the whiter, higher clouds along the frontal band and the wave itself.

Continued deepening of the cyclone is apparent in Fig. 1c, taken at 0820 GMT. The center of the system is now becoming better defined as the dry air intrusion becomes more established and the circulation around the system becomes more visible. The cyclone already appears to be entering the occlusion stage.

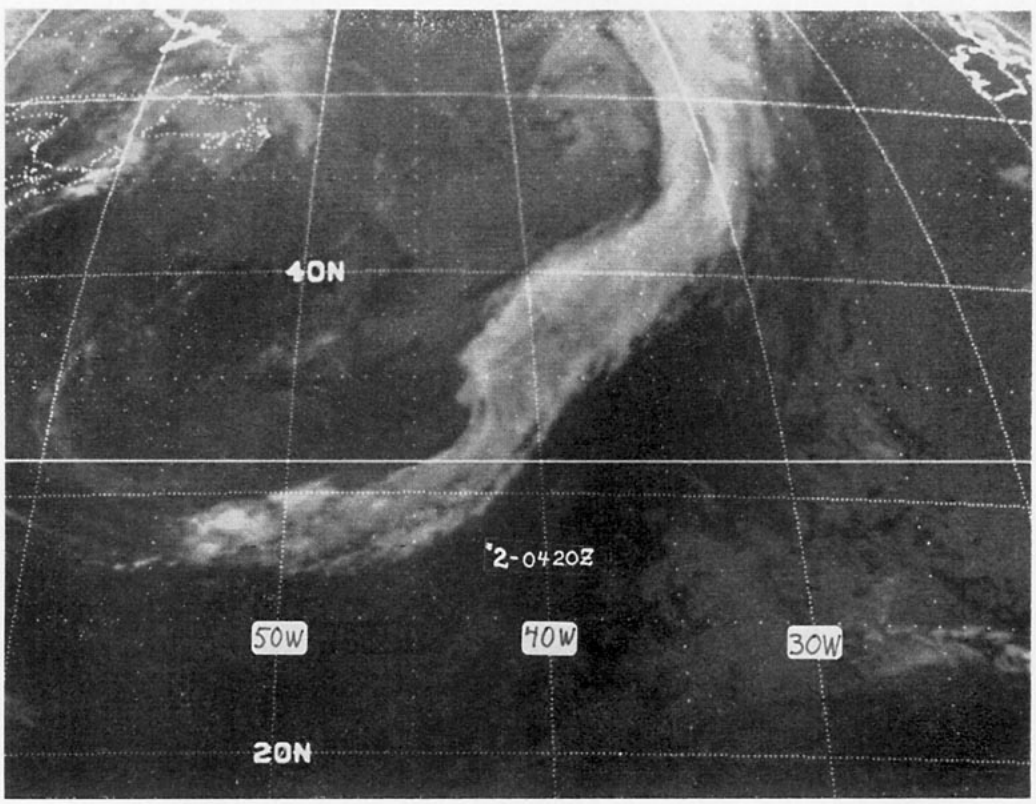
In Fig. 1d, a picture taken just 12 hours after the initial photograph in the series, we can see that the development phase of the life cycle is now complete. The system center is very well defined at about 37N, 42.5W. Again, the contrast between the low clouds adjacent to the system and the higher clouds defining the center is strikingly apparent.

This remarkable sequence, occurring mainly during nighttime hours, illustrates the value of the SMS-1 IR pictures now being received regularly every 30 minutes throughout the day and night. It is now possible to follow visually all types of weather situations on a 24-hr basis, which is especially valuable in "data sparse" areas over the oceans.

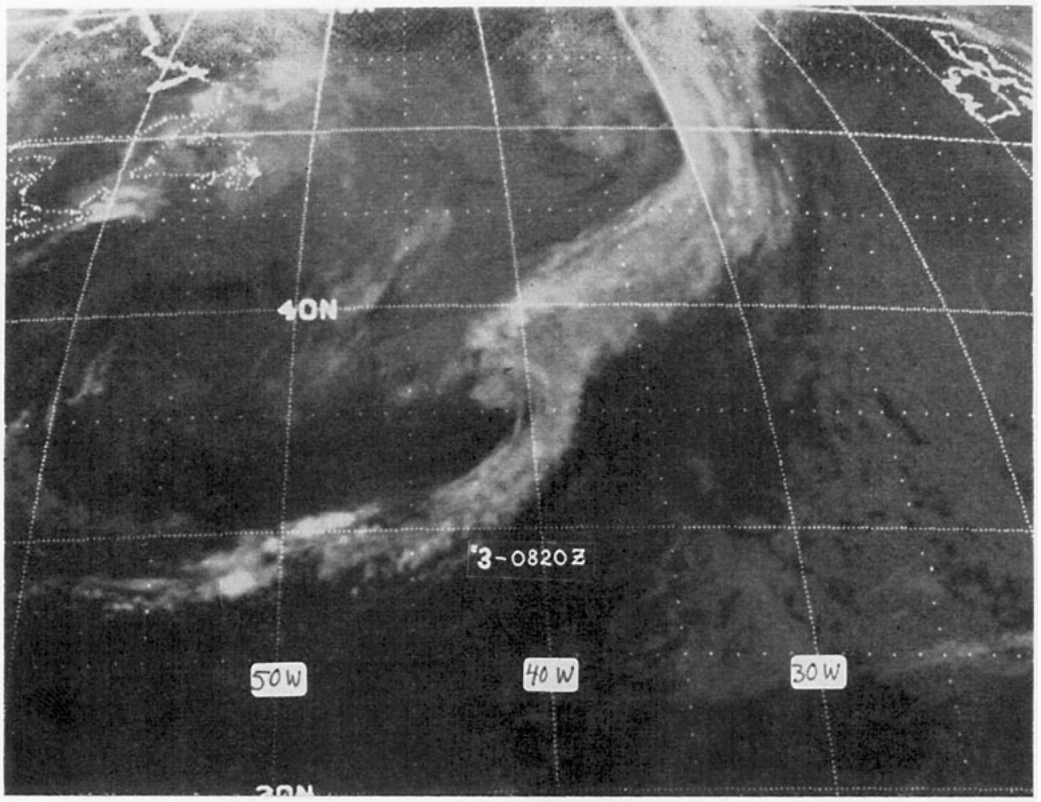
Acknowlegment. Special thanks to Mr. John McPherson, MATSCO/GE photo-technician at the Miami SFSS, for his work in providing these pictures.



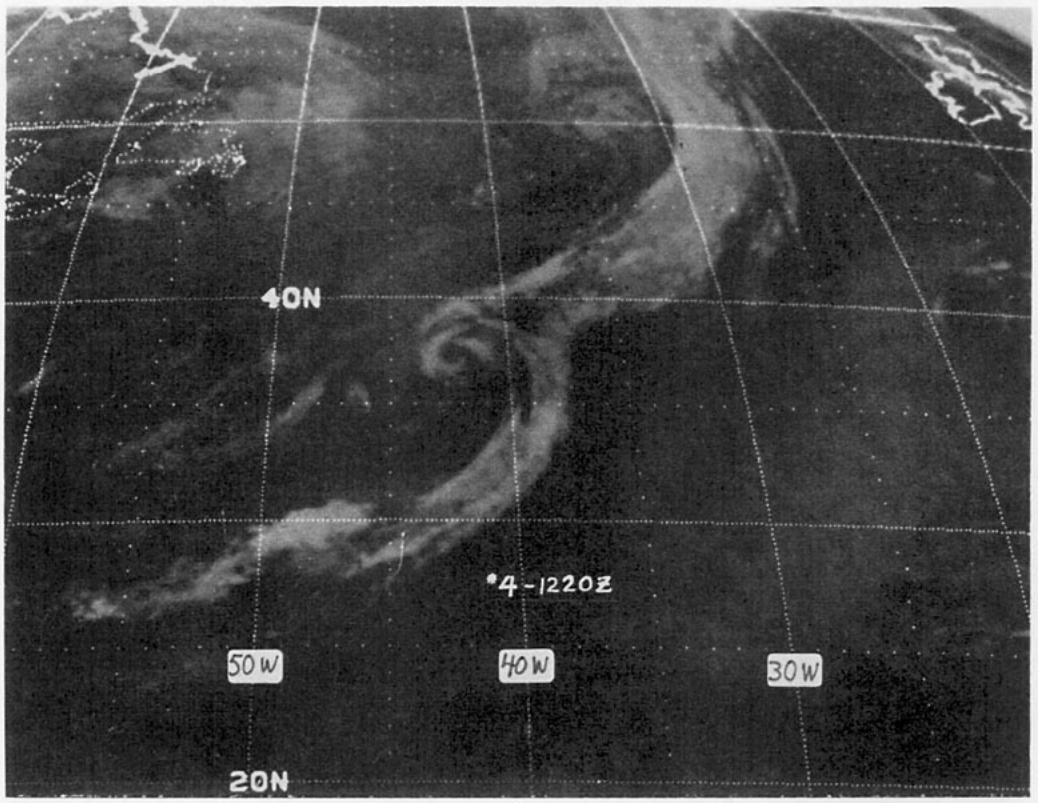
(a)



(b)



(c)



(d)

FIG. 1. SMS-1 IR pictures on 12 June 1974 at (a) 0021 GMT, (b) 0420 GMT, (c) 0820 GMT, and (d) 1220 GMT.