

The Hebert-Poteat Subtropical Cyclone Technique

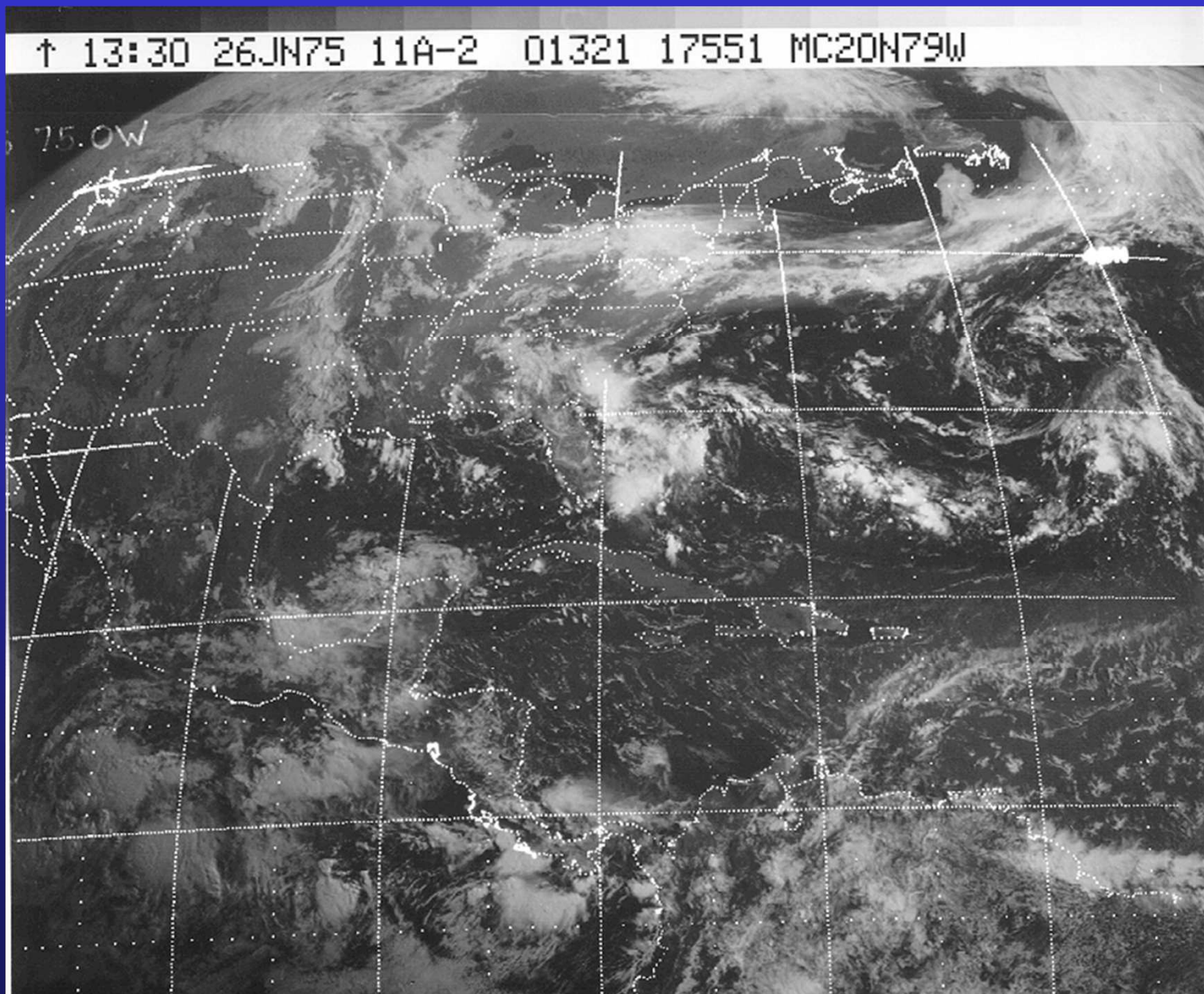
JACK BEVEN
NATIONAL HURRICANE
CENTER

WHERE AMERICA'S CLIMATE AND WEATHER SERVICES BEGIN

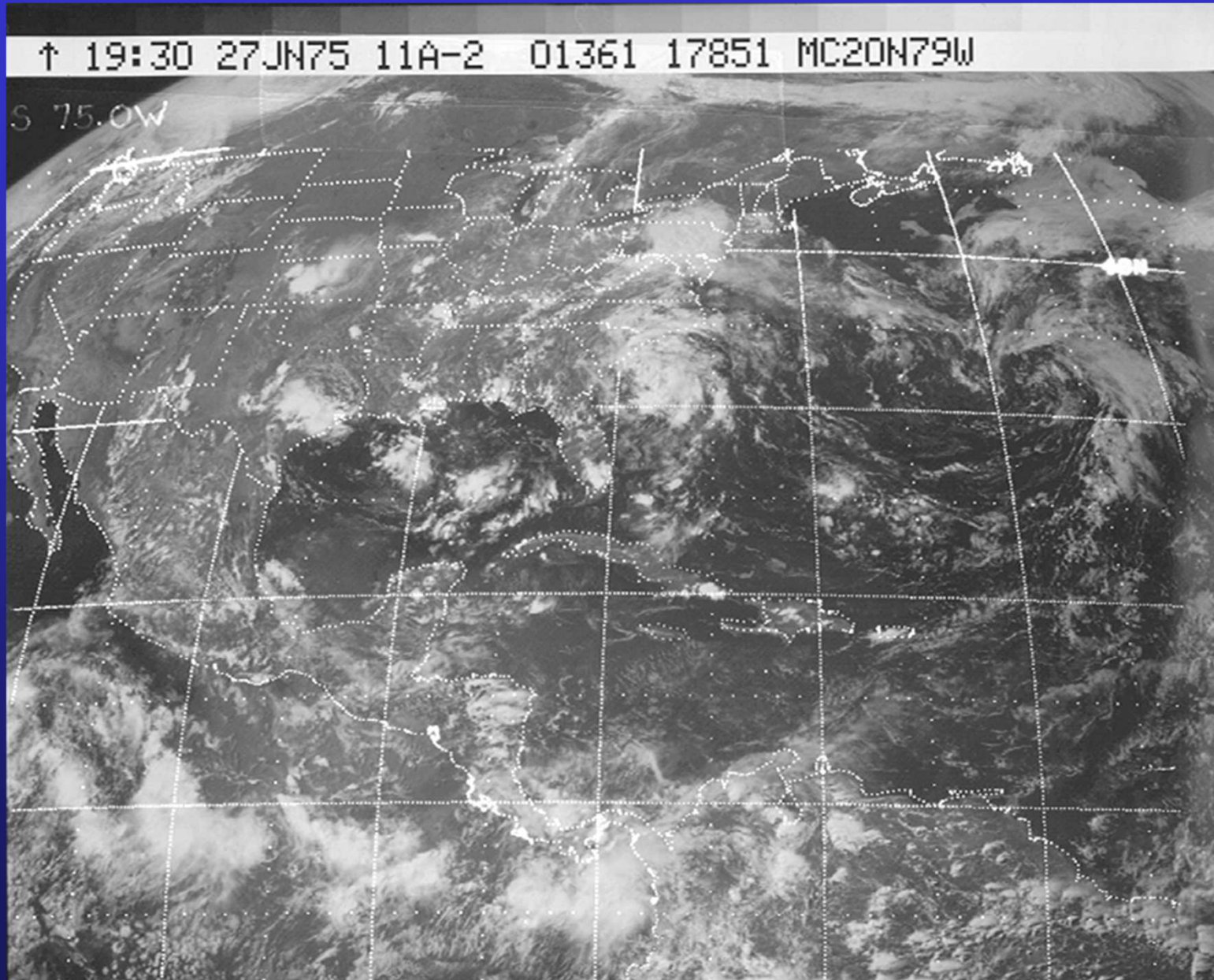
What is a subtropical cyclone?

- **Non-frontal cyclone with characteristics of both tropical and extratropical cyclones, receiving energy from both baroclinic temperature contrast and convective energy release**
- **Comes in many sizes and structures**
- **Many subtropical cyclones become tropical cyclones - i. e. Karen (2001), Delta (2005)**

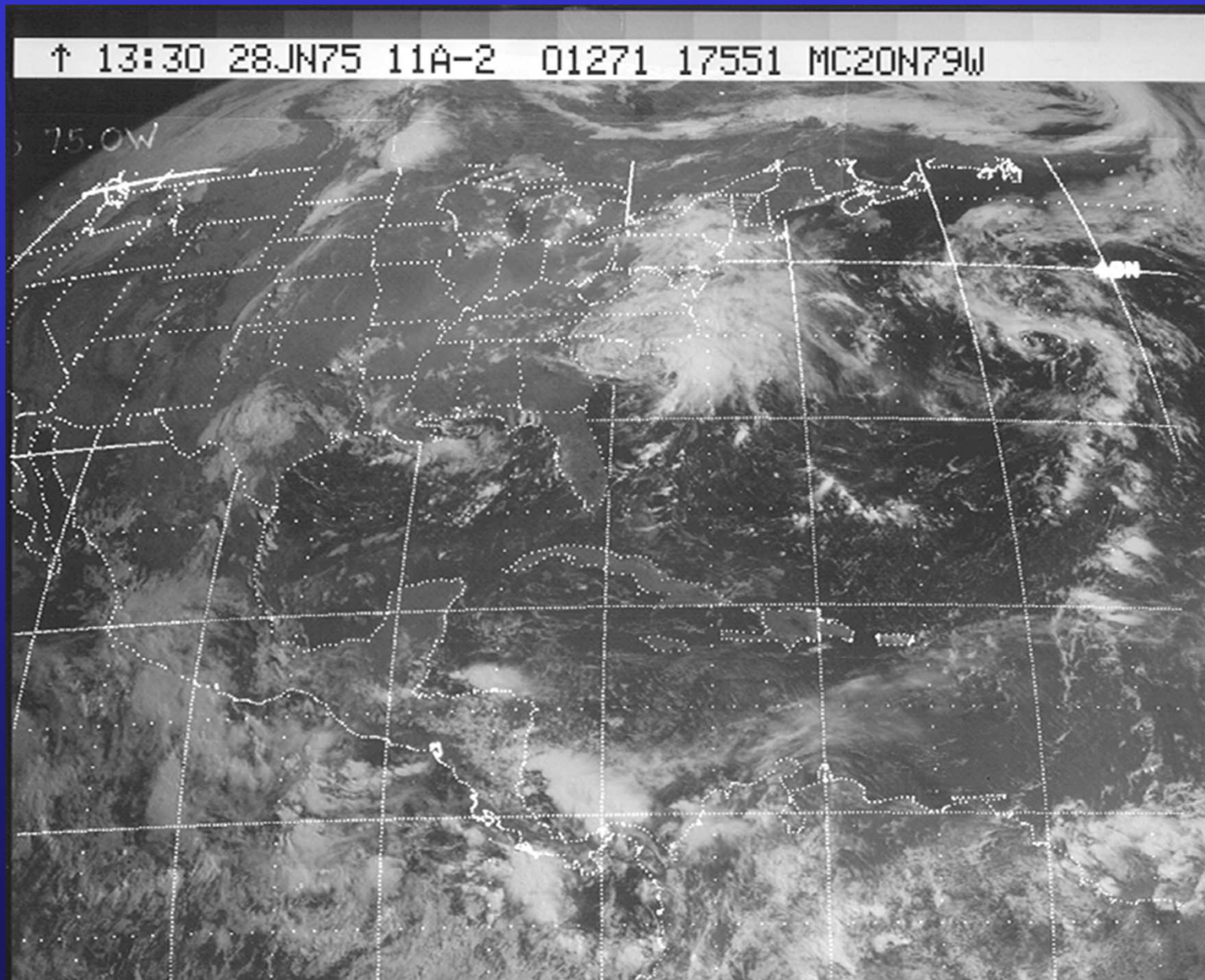
1330 UTC 26 June 1975



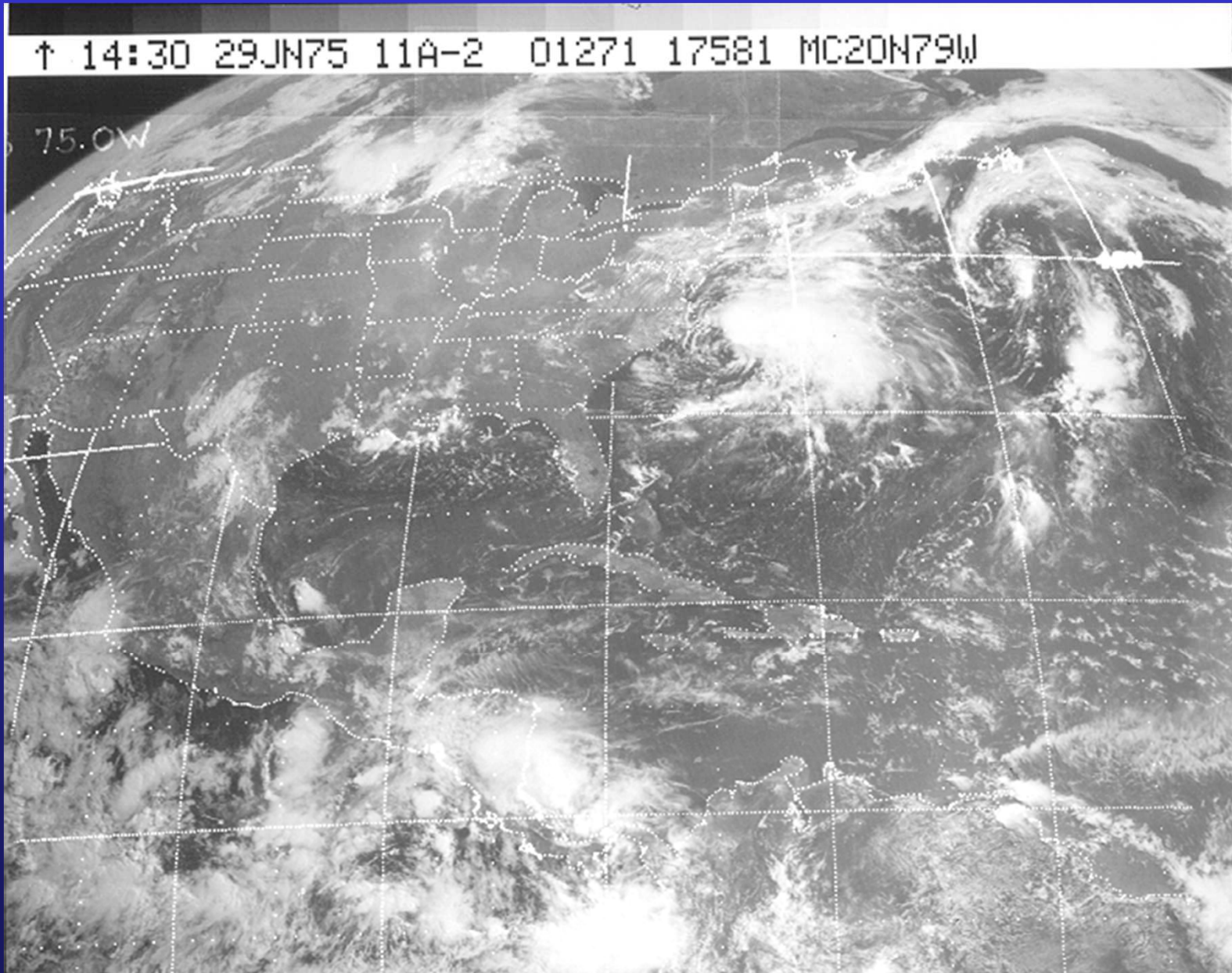
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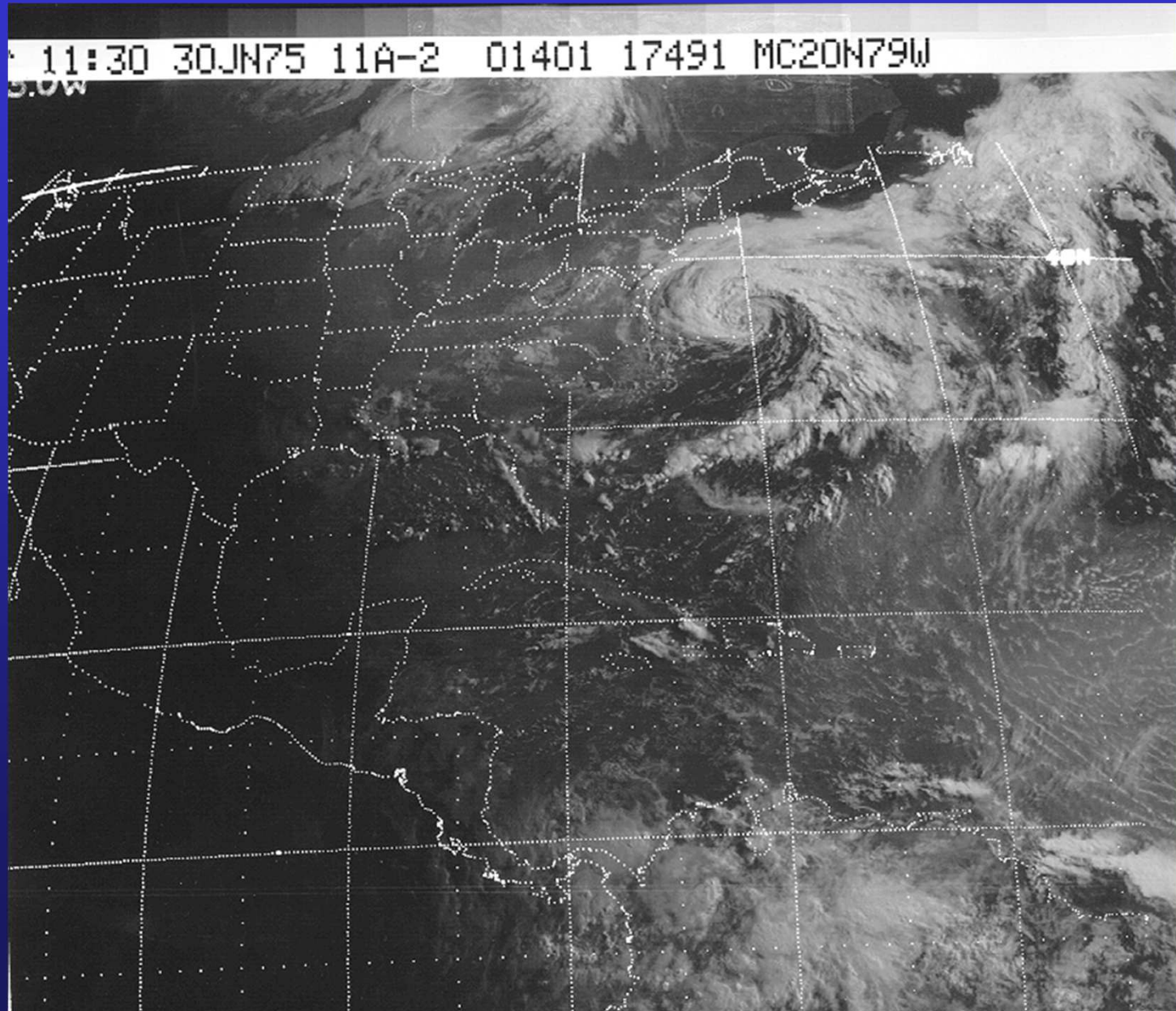
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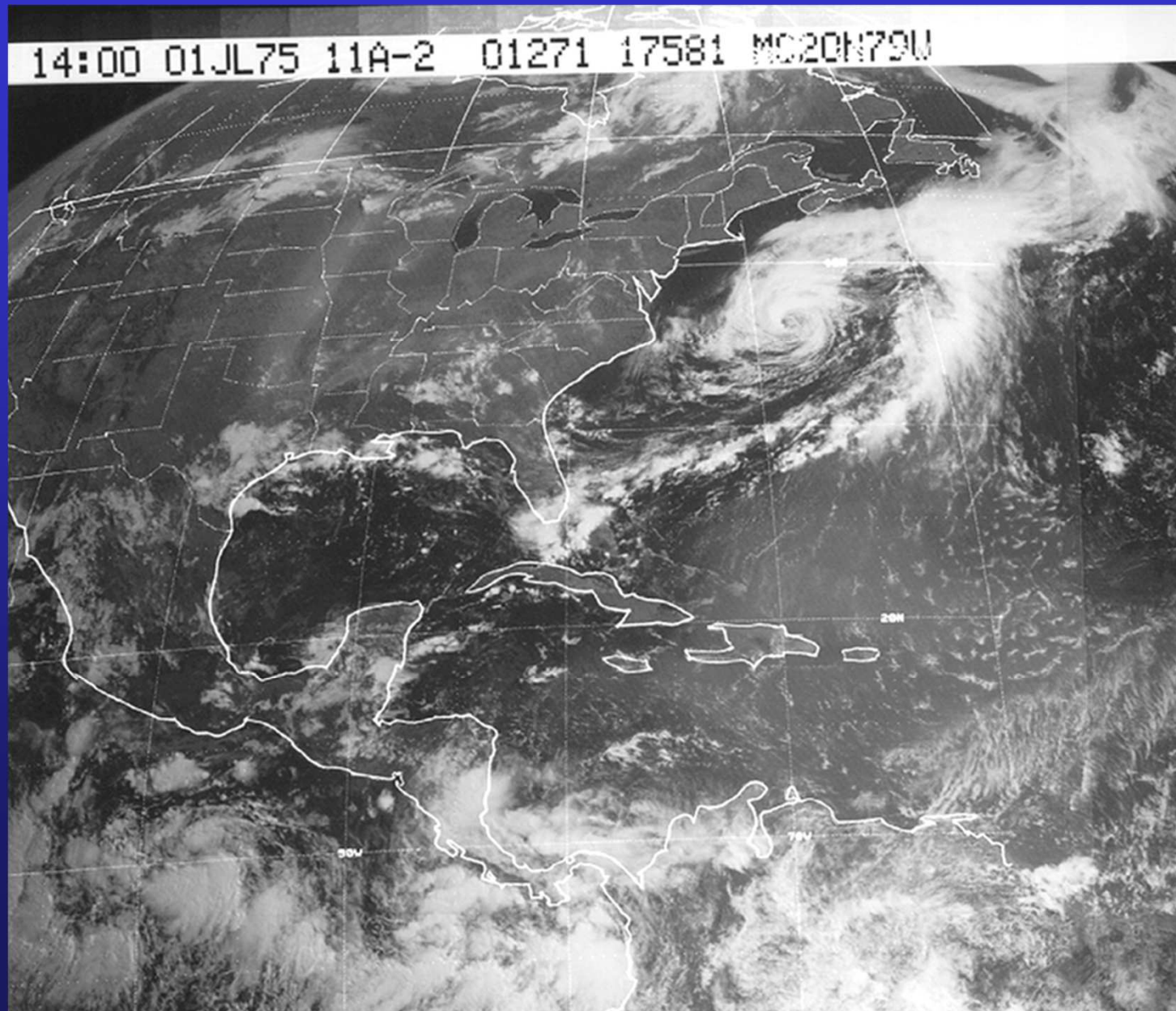
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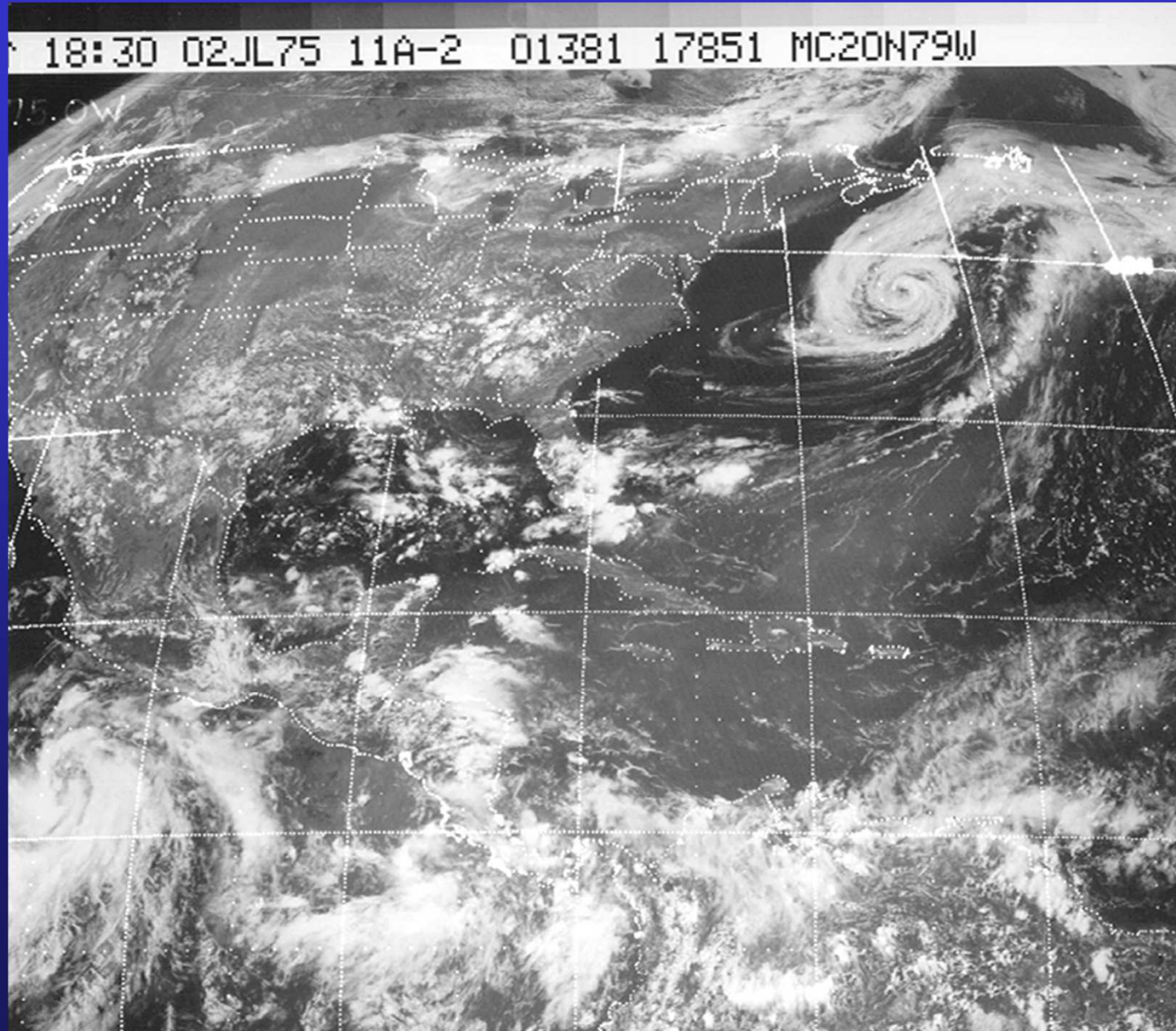
1130 UTC 30 June 1975 - 987 mb



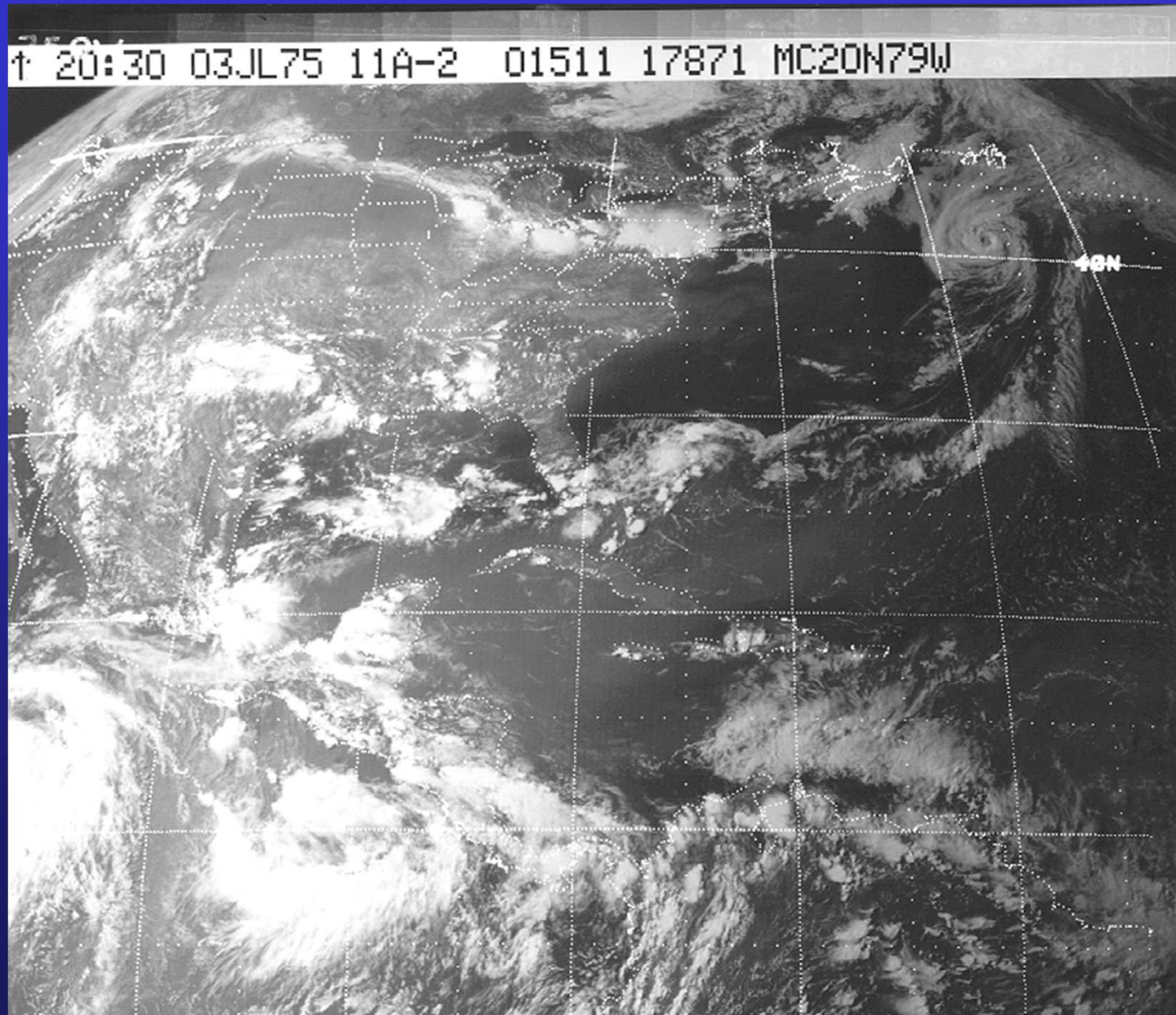
1400 UTC 1 July 1975 - 987 mb



1830 UTC 2 July 1975 - 986 mb



2030 UTC 3 July 1975



What is the Hebert-Poteat Technique?

- **A pattern-matching method of estimating the intensity of subtropical cyclones**
- **A compliment to the Dvorak technique**

Similarities Between Hebert-Poteat and Dvorak

- Both techniques use convective overcast
- Both techniques use the distance of the Cloud System Center (CSC) from the overcast
- ST cloud features are selected so that ST-Numbers correspond to T-Numbers if the cyclone becomes tropical
- Both techniques assume modeled development of the cyclone, with the T or ST numbers normally changing by ≤ 1.0 per day

Differences Between Hebert-Poteat and Dvorak

- HP considers environment in determining cyclone type
- HP permits a classification of ST1.5 or ST2.5 on the first day
- HP *cannot* have the CSC under a Central Dense Overcast (CDO)
- HP uses curvature of convective features for all ST classifications in the absence of bands
- HP designates a wind speed *range* for each ST category
- Translational speed excess *above 20 kt* added to the ST cloud feature wind estimate
- HP uses one rule regarding intensity changes

Hebert-Poteat Output

| Classification | Intensity |
|----------------|-----------|
| ST 1.5 | 25-30 kt |
| ST 2.5 | 35-40 kt |
| ST 3.0 | 45-50 kt |
| ST 3.5 | 55-65 kt |

If the translation speed of the cyclone exceeds 20 kt, the excess should be added to the intensity obtained by the cloud feature criteria.

Hebert-Poteat Criteria

ST 1.5

- Low-level circulation center located $1/2^\circ$ to 2° of latitude from the edge of poorly organized convection (not necessarily dense)
- For cold lows, connection may *not* be connected to other systems, and a small area ($<3^\circ$ latitude) of deep layer convection exists near the center

Hebert-Poteat Criteria

ST 2.5

- Low-level circulation center located $1/2^\circ$ to 2° from increased deep-layer convection (not necessarily dense) with greater curvature of broad cloud lines or bands than on the previous day
- Outer convective band 5° - 10° east of the center, and possibly another convective band 2° - 4° west-north of the center

Hebert-Poteat Criteria

ST 3.0

- Same criteria as for ST 2.5 except greater curvature of cloud lines or bands, and better organized convection
- Evidence of banding within 1° of the circulation center

Hebert-Poteat Criteria

ST 3.5

- **Deep-layer convection** (frequently dense overcast) in band(s) 1° - 3° from the center (*no CDO*)
- **Outer convective band** 5° - 10° to the east weaker than for ST 3.0, but new band may form 5° - 10° west of the center
- **For systems moving rapidly eastward,** there may be only a dense overcast ($\geq 3^{\circ}$ latitude) about 2° - 4° east of the center

Hebert-Poteat Cloud Patterns

ST 1.5



ST 2.5



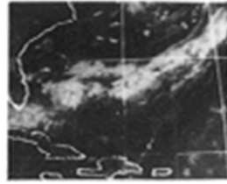
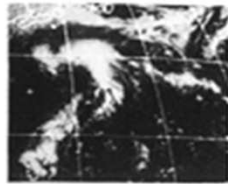
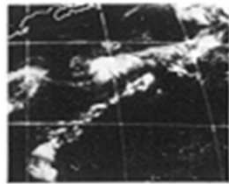
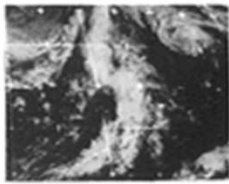
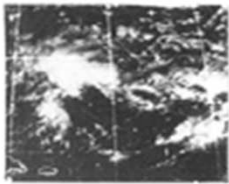
ST 3



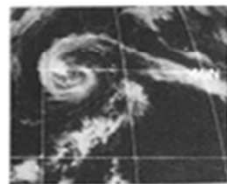
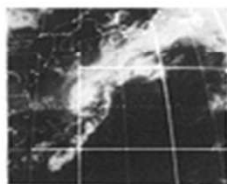
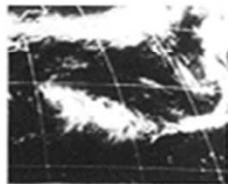
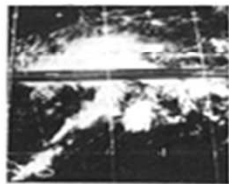
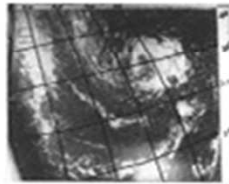
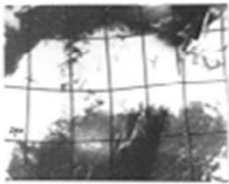
ST 3.5



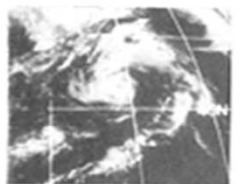
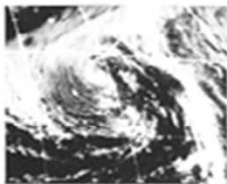
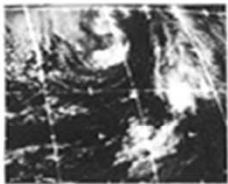
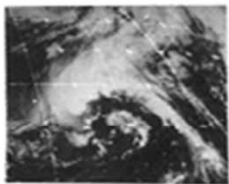
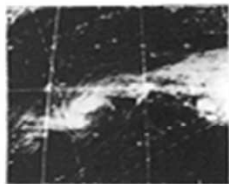
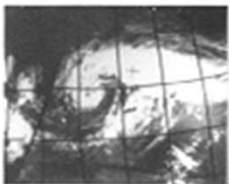
ST 1.5



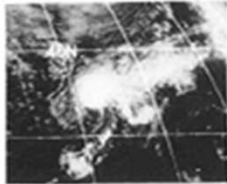
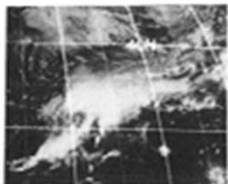
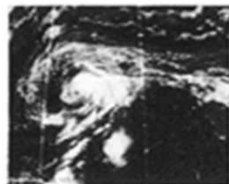
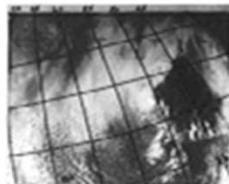
ST 2.5



ST 3



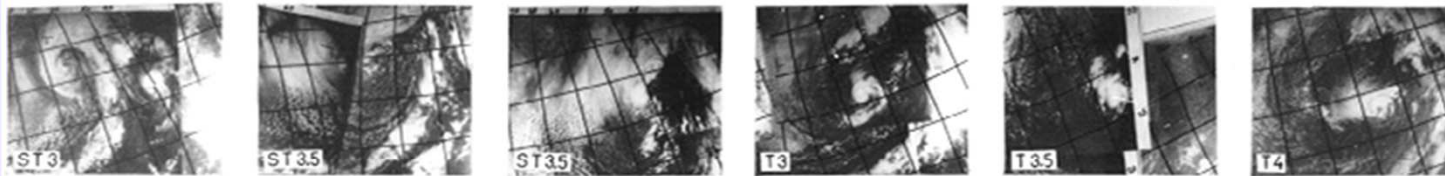
ST 3.5



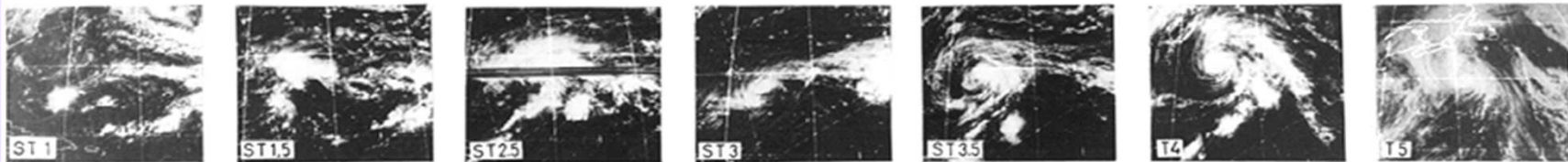
Hebert-Poteat Examples



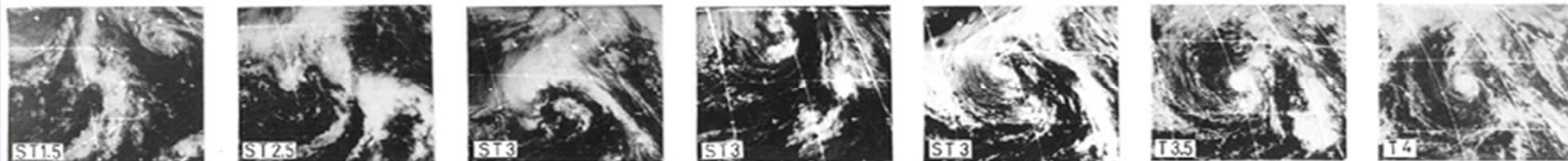
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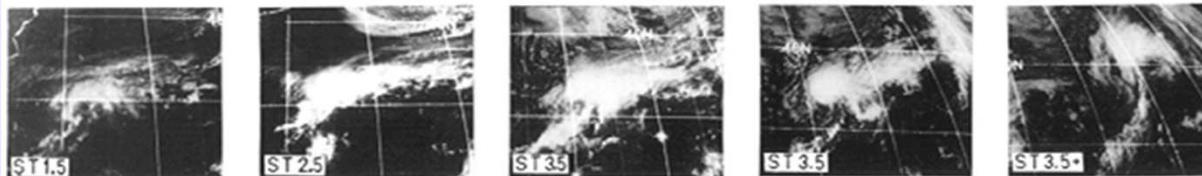
2. COLD LOW



3. EAST OF UPPER TROUGH



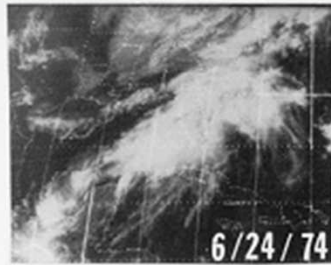
4. FRONTAL WAVE



5. EAST OF UPPER TROUGH ACQUIRING EXCESSIVE TRANSLATIONAL SPEED
(+ An additional 10 knots translational speed — see text)

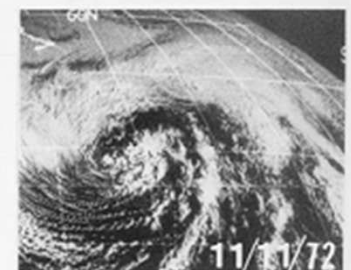
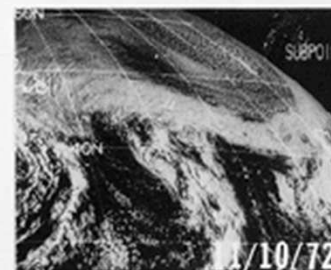
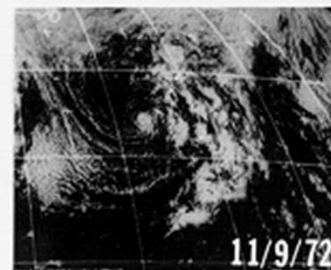
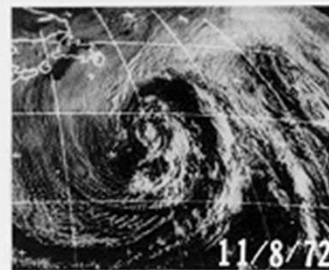
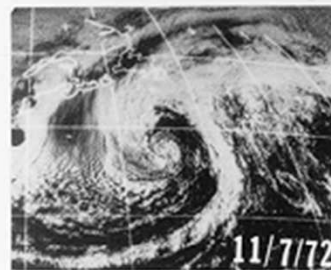
Hebert-Poteat Pattern Ambiguities

1



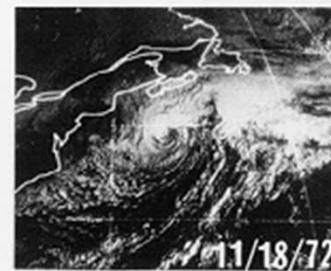
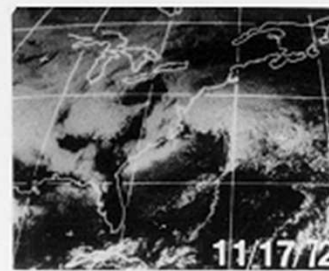
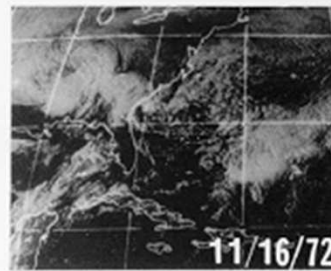
DIFFICULT TO CLASSIFY BY TECHNIQUE

2

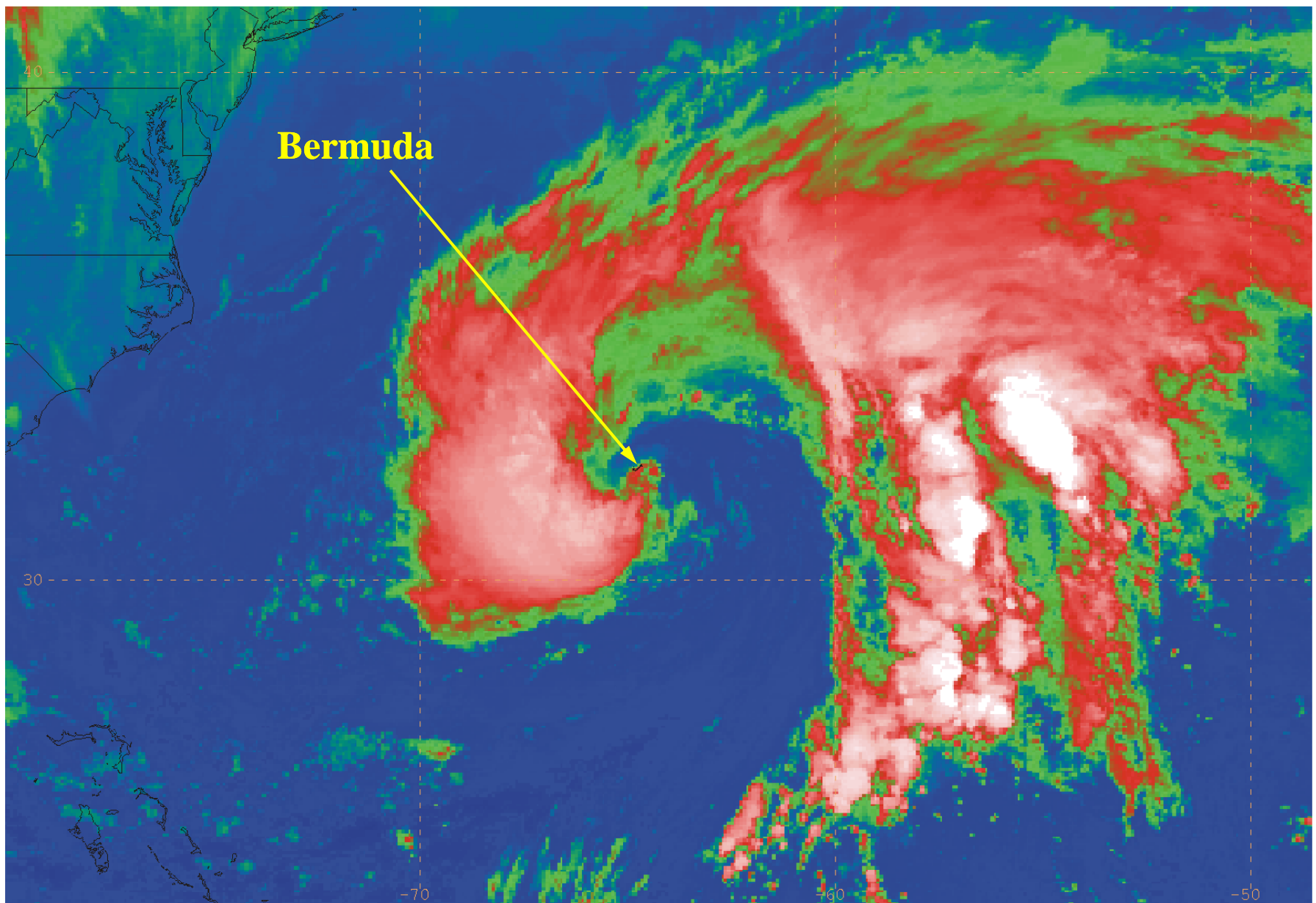


DIFFICULT TO DISTINGUISH WHETHER SUBTROPICAL OR EXTRATROPICAL

3



DIFFICULT TO CLASSIFY EITHER SUBTROPICAL OR EXTRATROPICAL



011011/2345 GOES8 IR

Pre-Karen low pummels Bermuda

Hebert-Poteat Rule

- Limit weakening subtropical tropical cyclones to a 1 ST-Number per day decrease

Notes on the Hebert-Poteat Technique

- There are no rules on when to switch from the Hebert-Poteat technique to the Dvorak technique as a subtropical cyclone becomes tropical. However, experience suggests the point when the Dvorak T-numbers become equal to the ST-numbers is a good time
- It can be difficult to tell the difference between a subtropical and extratropical cyclone in satellite imagery, especially for systems embedded in the westerlies

