IMPACTS OF SEAWINDS DATA ON MARINE WEATHER SYSTEMS

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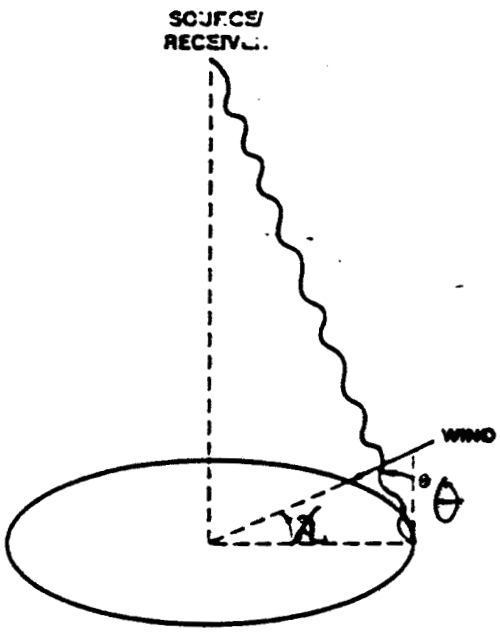
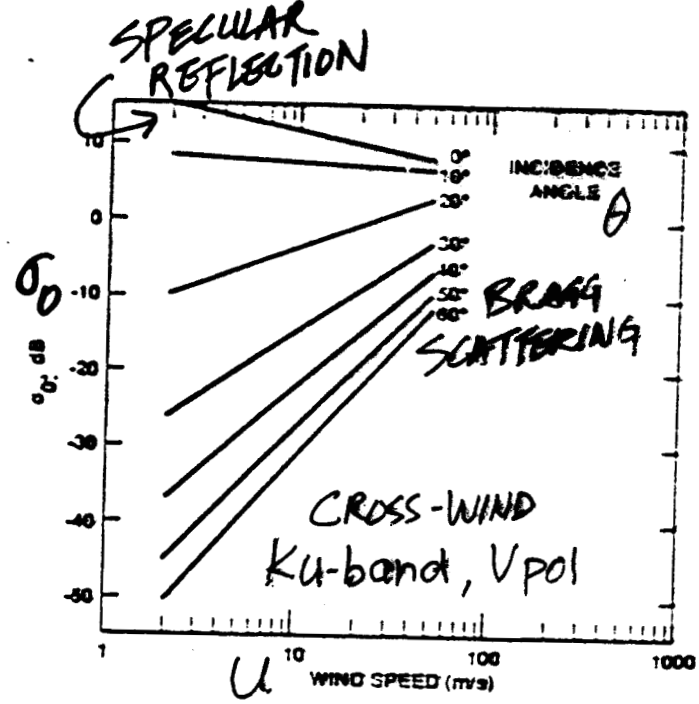
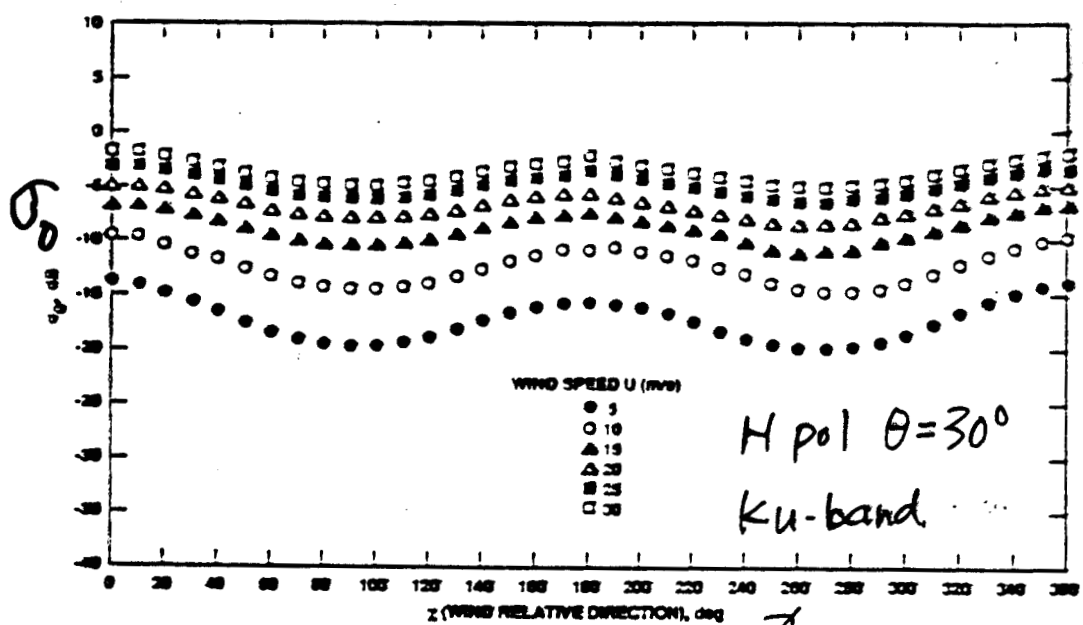
The scatterometer sends microwave pulses to the Earth's surface and measure the backscattered power which depends on surface roughness. The roughness may describe characteristics of sea ice or vegetation over land. Over ocean, it represents the small waves which are in equilibrium with the wind. Measuring ocean surface wind vector is the main objective of the NASA scatterometer.

$$\sigma_o = f\,(\,U, \theta, \chi, f, p, ..)$$

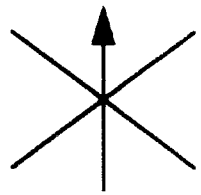
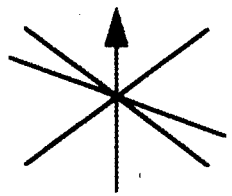
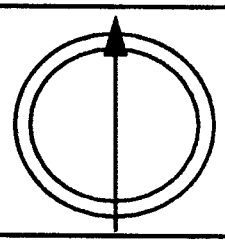
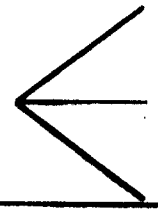
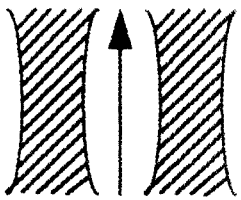
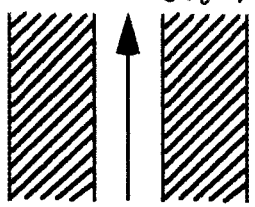
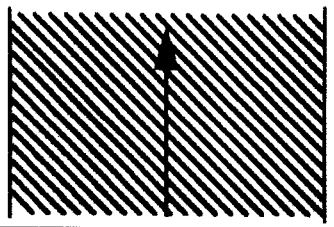
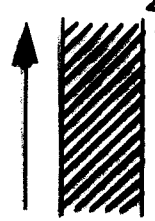






$$\sigma_0(dB) = G(\theta,\chi) + H(\theta,\chi)\log U$$

Spaceborne Scatterometers
Past, Present, and Future

	SASS	NSCAT	SeaWinds	**ERS-1/2**
Frequency	14.6 GHz	13.995 GHz	13.402 GHz	**5.3 GHz**
Scan Pattern				
Polarization	V-H, V-H	V, V-H, V	V, H	**V ONLY**
Beam Resolution	Fixed Doppler	Variable Doppler	Spot	**RANGE GATE**
Resolution	50/100 km	25/50 km	35/50 km	**25/50 km**
Swath		600km 		475 km 
Daily / 2-day Coverage	Variable	77/97%	93/100%	**41%**
Dates	6/78 - 10/78	8/96 - 8/99	2/99 - 2/02	**91 +**

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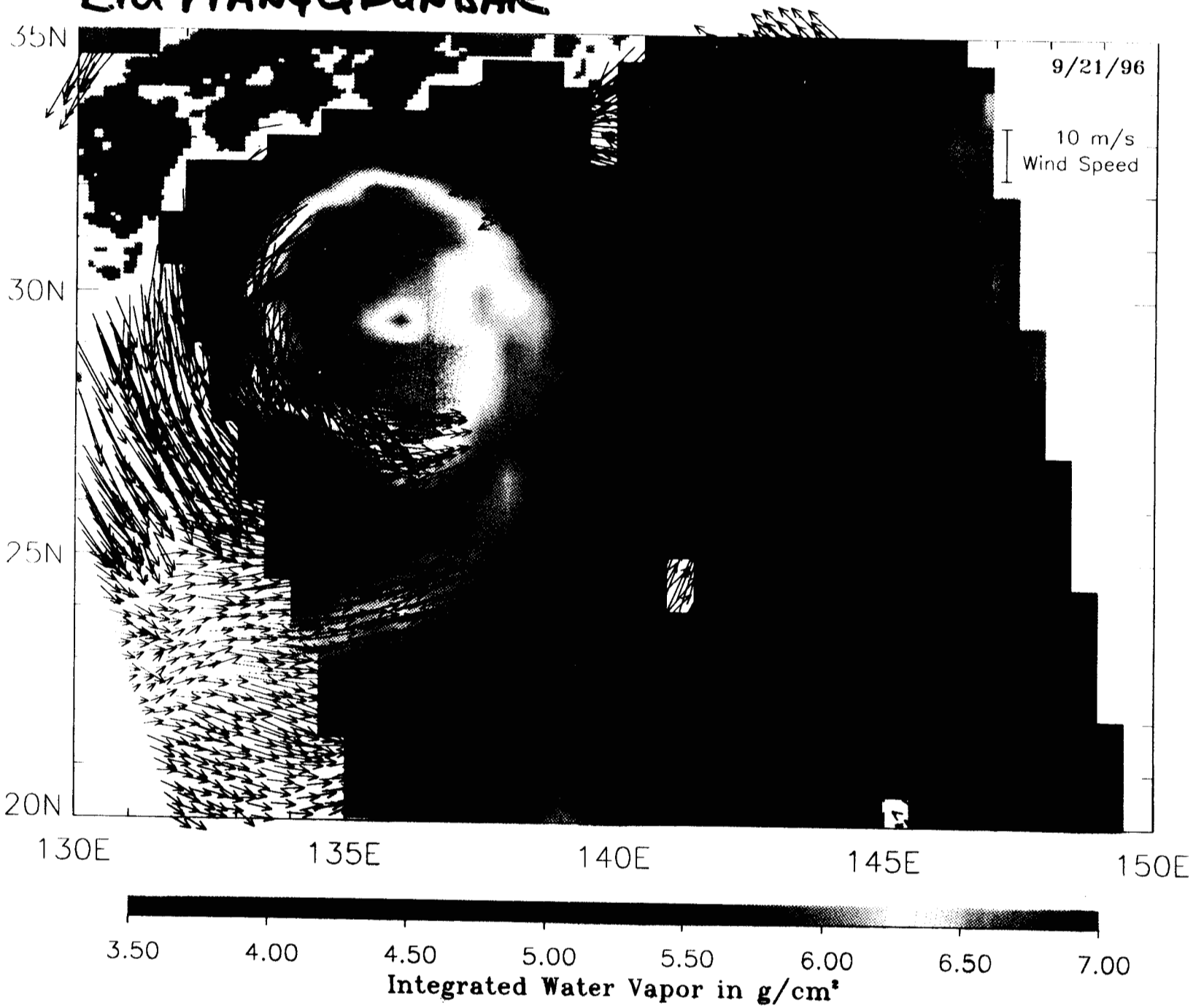
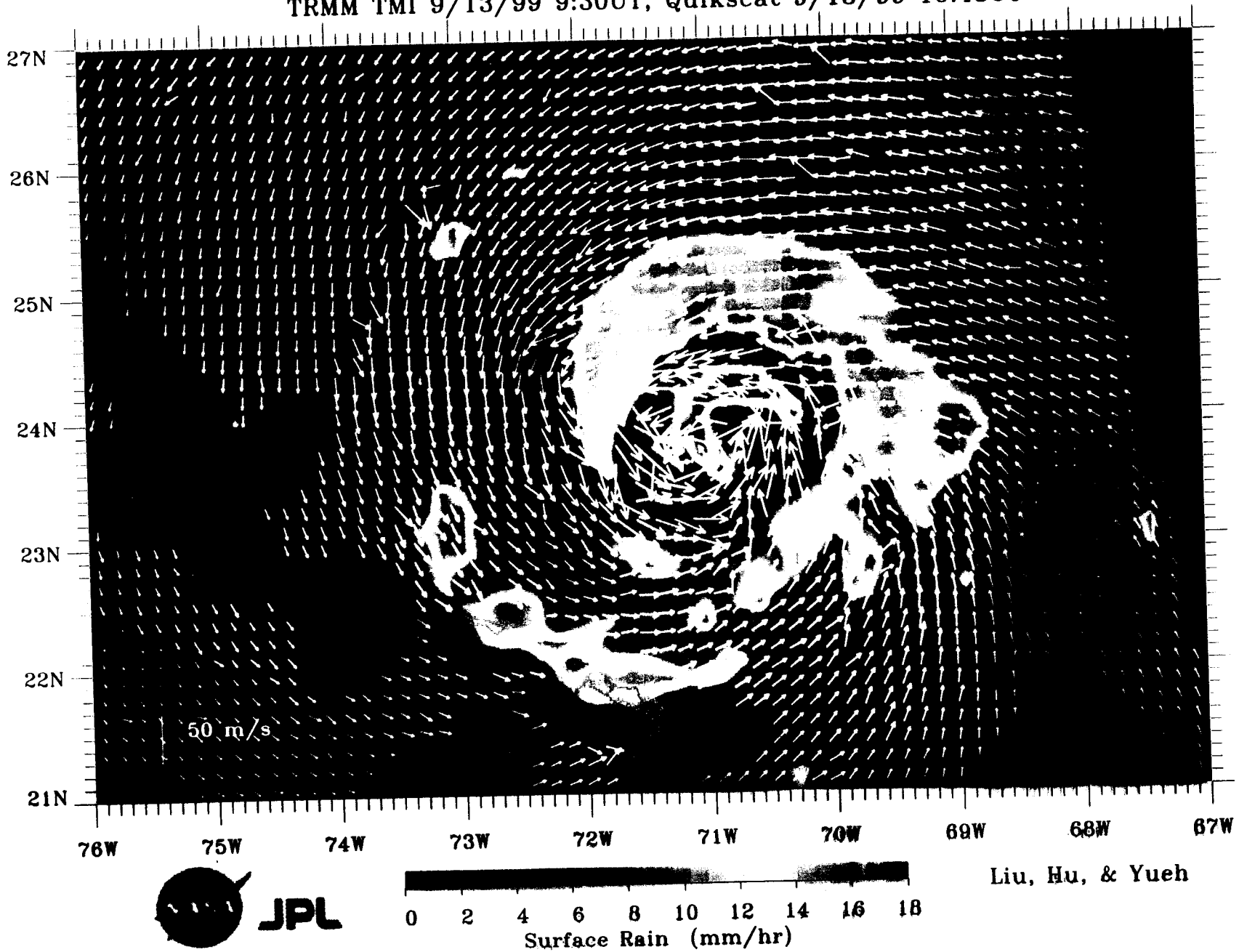


Hurricane Floyd

TRMM TMI 9/13/99 9:30UT, Quikscat 9/13/99 10:48UT



JPL

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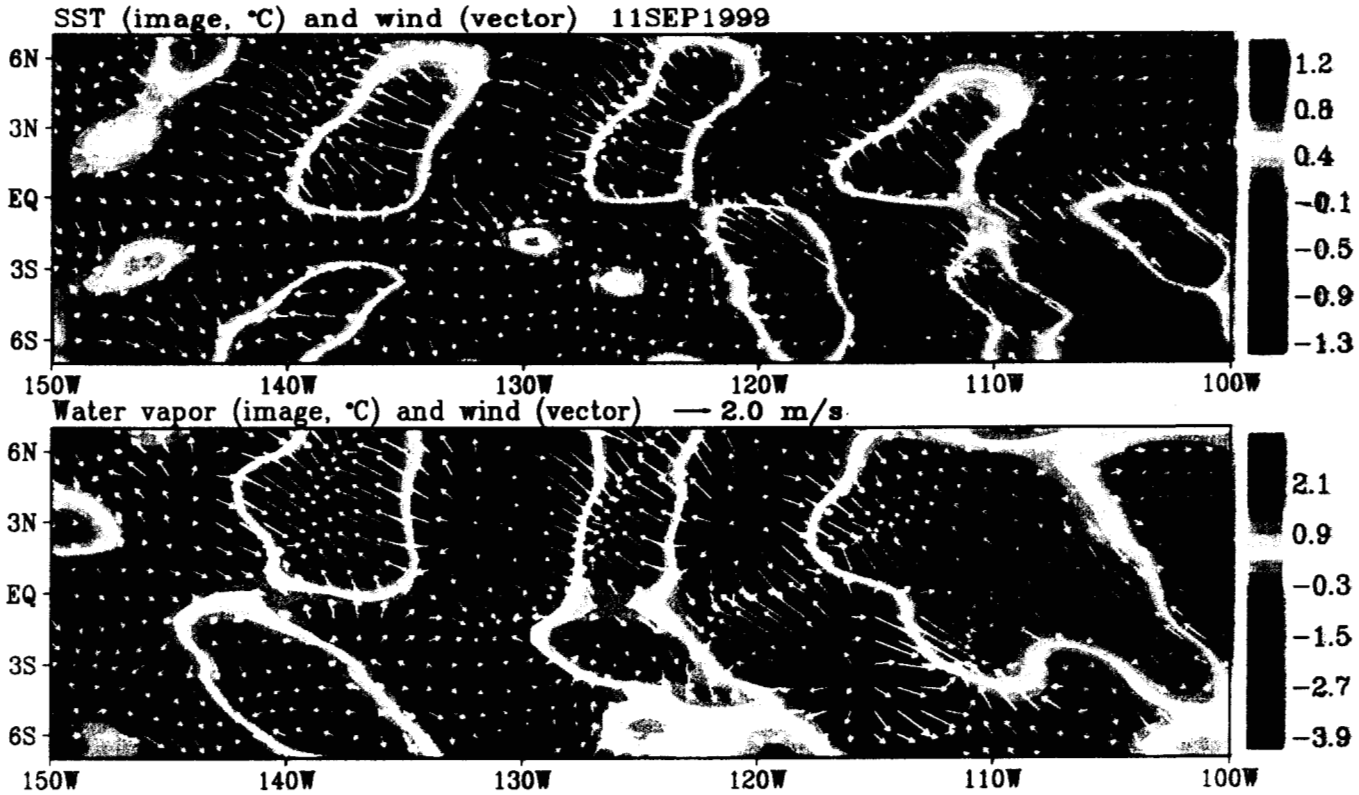
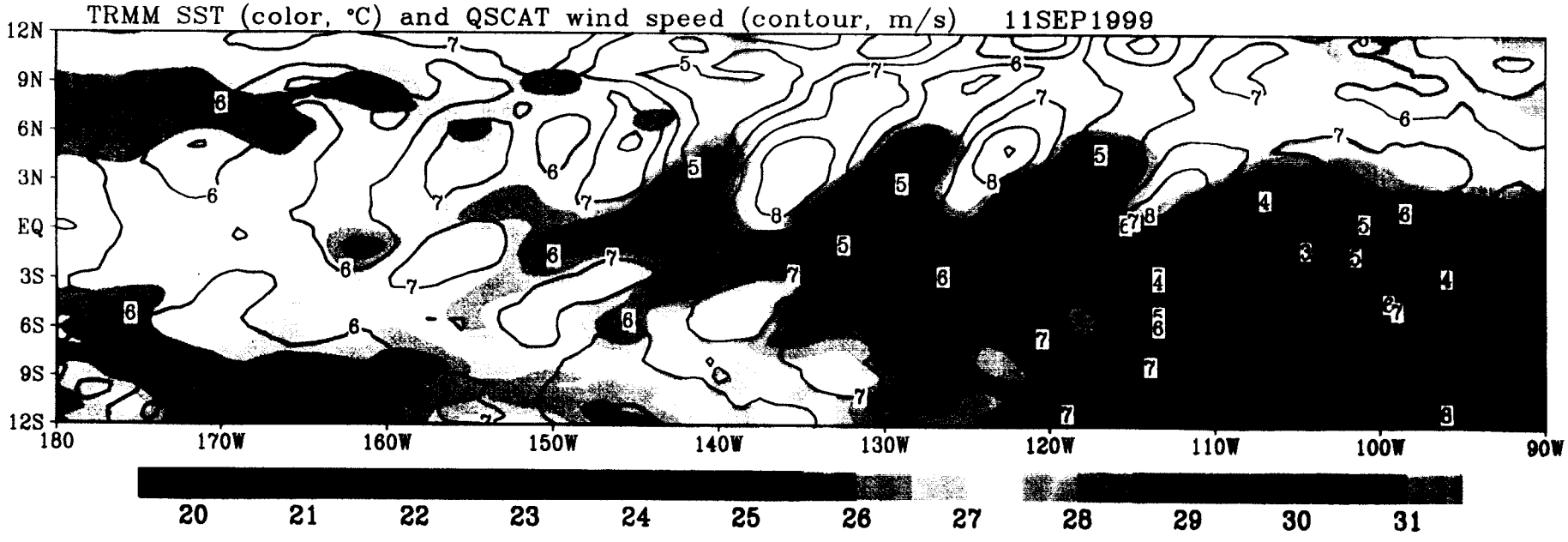
$$\omega_p = -\int_{p_s}^{p} \nabla_h . \vec{u} dp$$

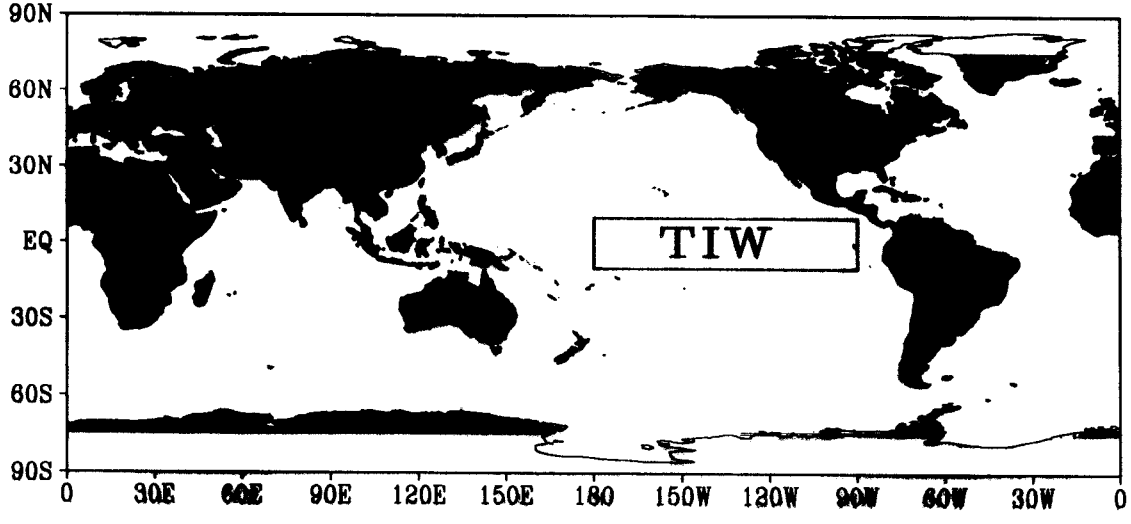
$$Q = -(\frac{\partial q}{\partial t} + \vec{u}\nabla_h q + \omega \frac{\partial q}{\partial p}) = c - e$$

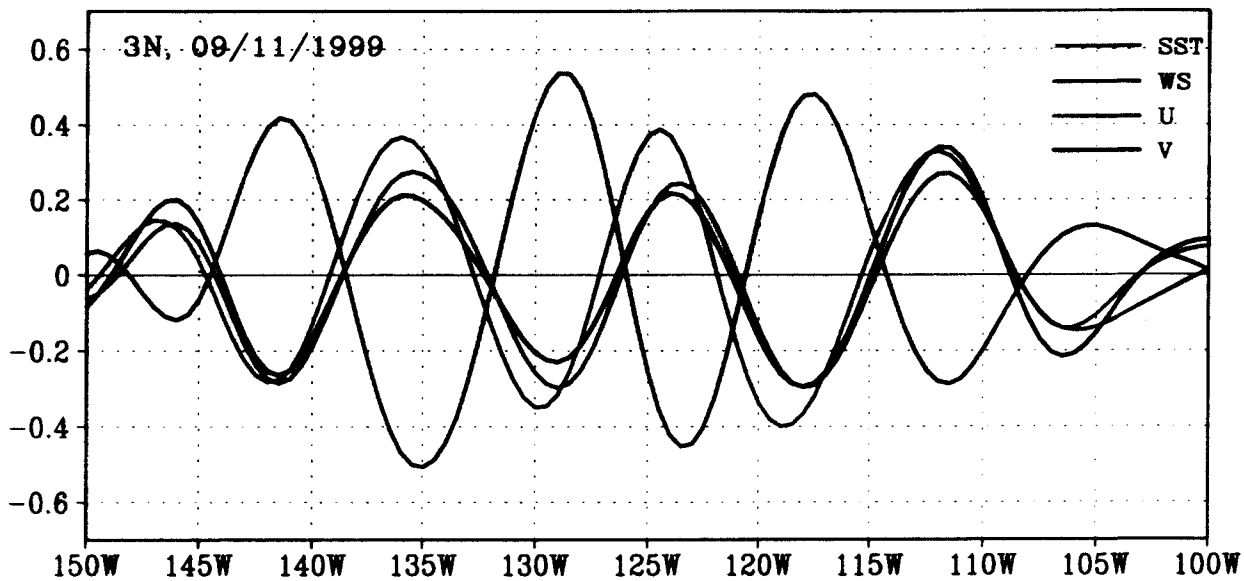
$$H = LQ / c_p$$

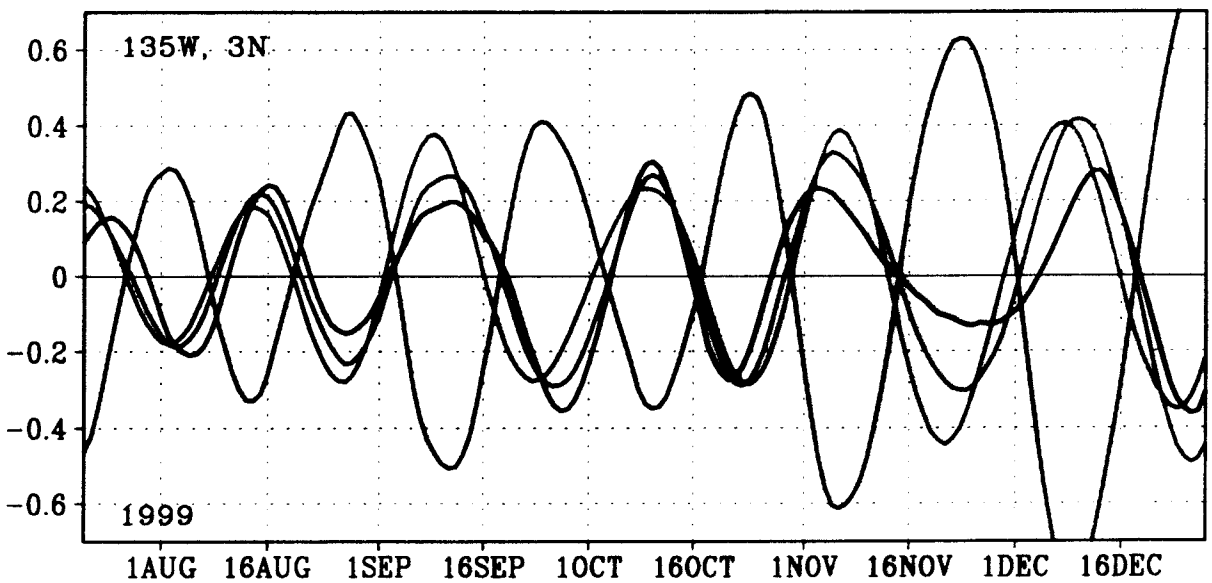
$$F = P - E = -\frac{1}{g}\int_{0}^{p_s} Q dp$$

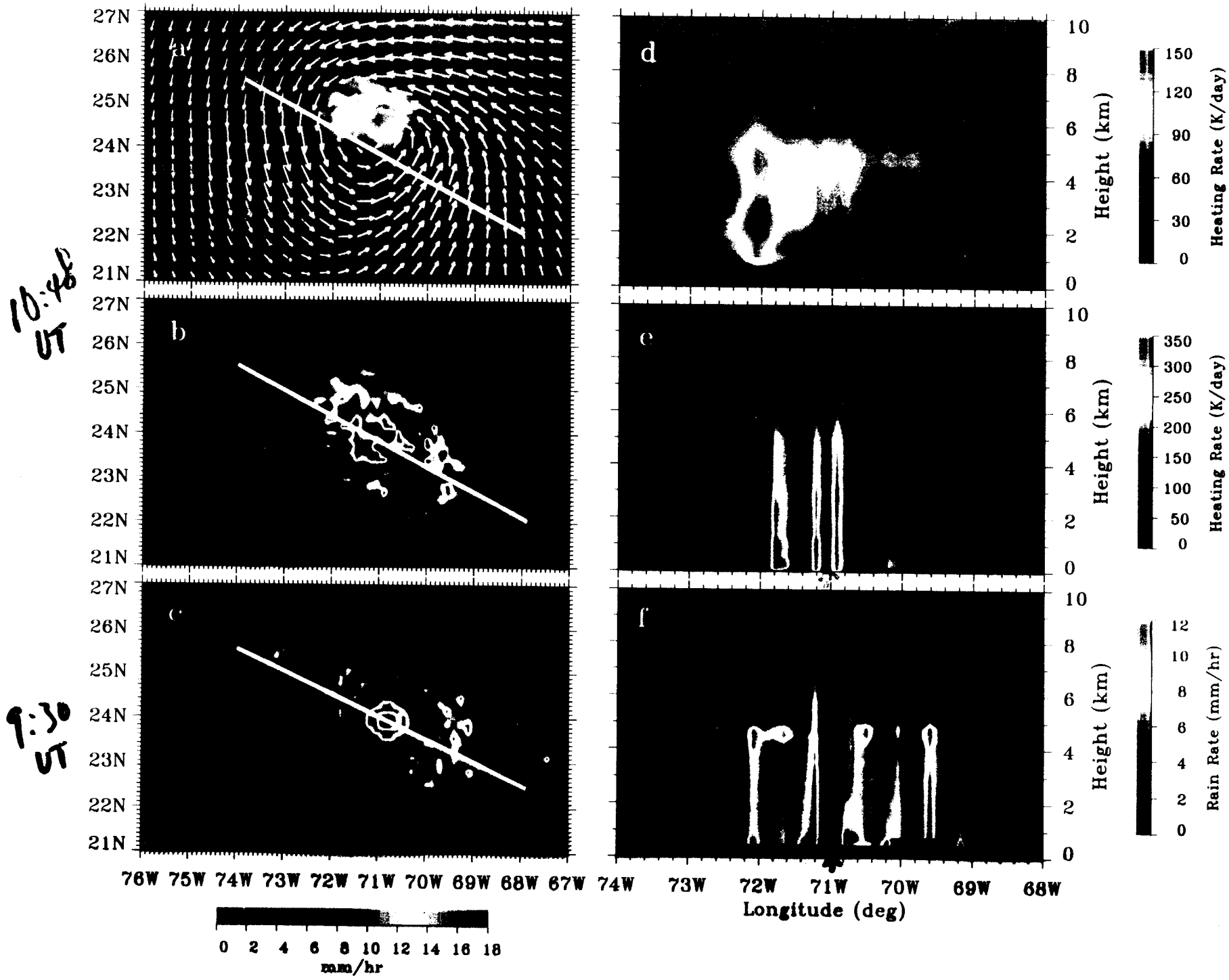

SST (image, °C) and wind (vector) 11SEP1999
6N
3N
EQ
3S
6S
150W
140W
130W
120W
110W
100W
1.2
0.8
0.4
-0.1
-0.5
-0.9
-1.3
Water vapor (image, °C) and wind (vector) — 2.0 m/s
6N
3N
EQ
3S
6S
150W
140W
130W
120W
110W
100W
2.1
0.9
-0.3
-1.5
-2.7
-3.9

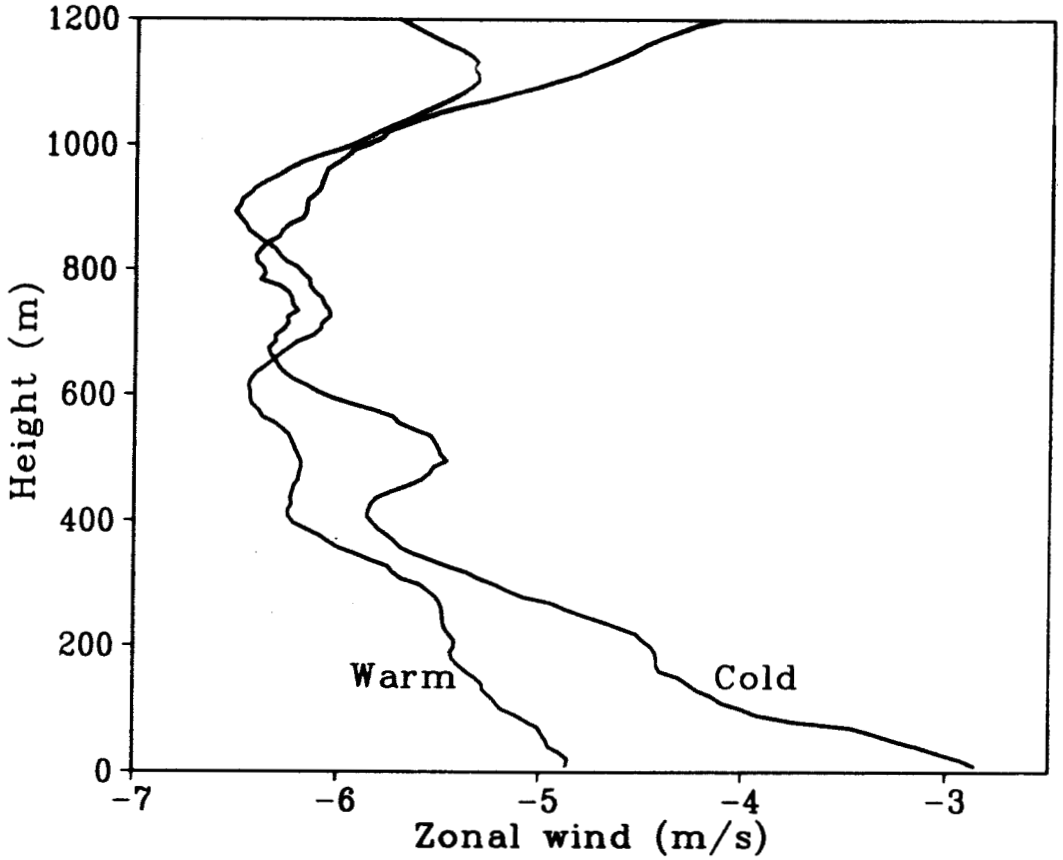

TRMM SST (color, °C) and QSCAT wind speed (contour, m/s) 11SEP1999
12N
9N
6N
3N
EQ
3S
6S
9S
12S
180
170W
160W
150W
140W
130W
120W
110W
100W
90W
20
21
22
23
24
25
26
27
28
29
30
31


90N
60N
30N
EQ
30S
60S
90S
0
30E
60E
90E
120E
150E
180
150W
120W
90W
60W
30W
0
TIW


3N, 09/11/1999
SST
WS
U
V
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
150W
145W
140W
135W
130W
125W
120W
115W
110W
105W
100W


135W, 3N
1999
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
1AUG
16AUG
1SEP
16SEP
1OCT
16OCT
1NOV
16NOV
1DEC
16DEC


a
b
c
d
e
f
10:46 UT
9:30 UT
27N
26N
25N
24N
23N
22N
21N
76W 75W 74W 73W 72W 71W 70W 69W 68W 67W
0 2 4 6 8 10 12 14 16 18
mm/hr
74W 73W 72W 71W 70W 69W 68W
Longitude (deg)
Height (km)
Heating Rate (K/day)
Rain Rate (mm/hr)

21-28

SHOYO MARU 140°-110°W 2°N. 9/79