# Air-sea Coupling of the Tropical Instability Waves

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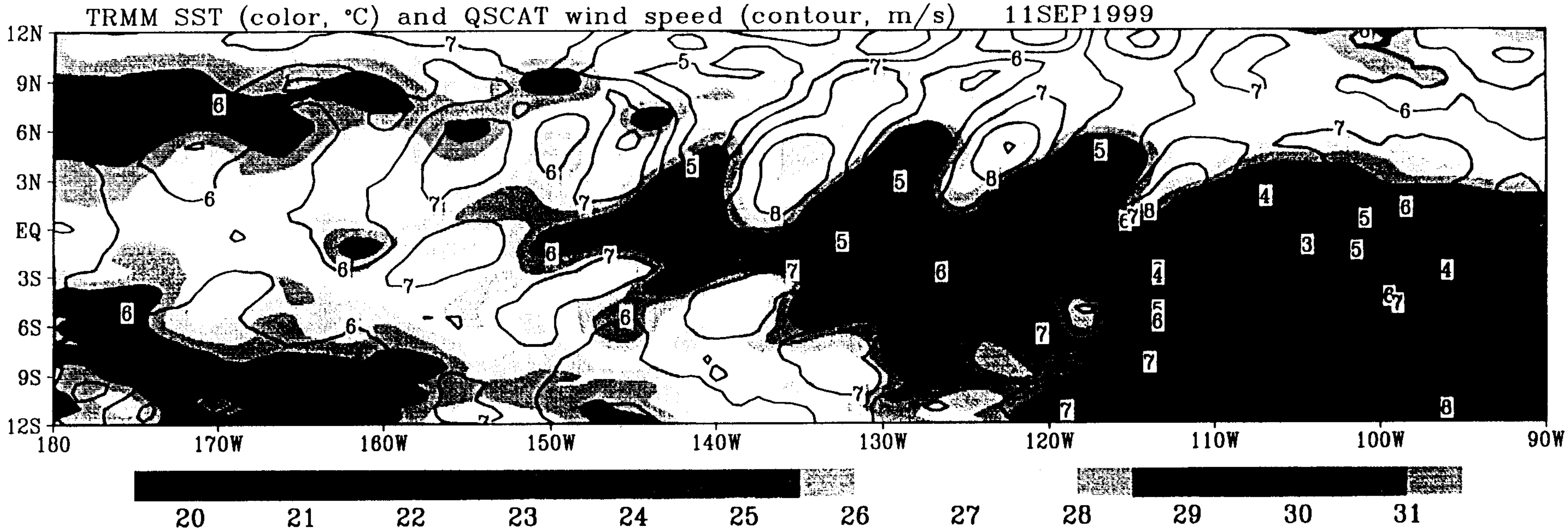
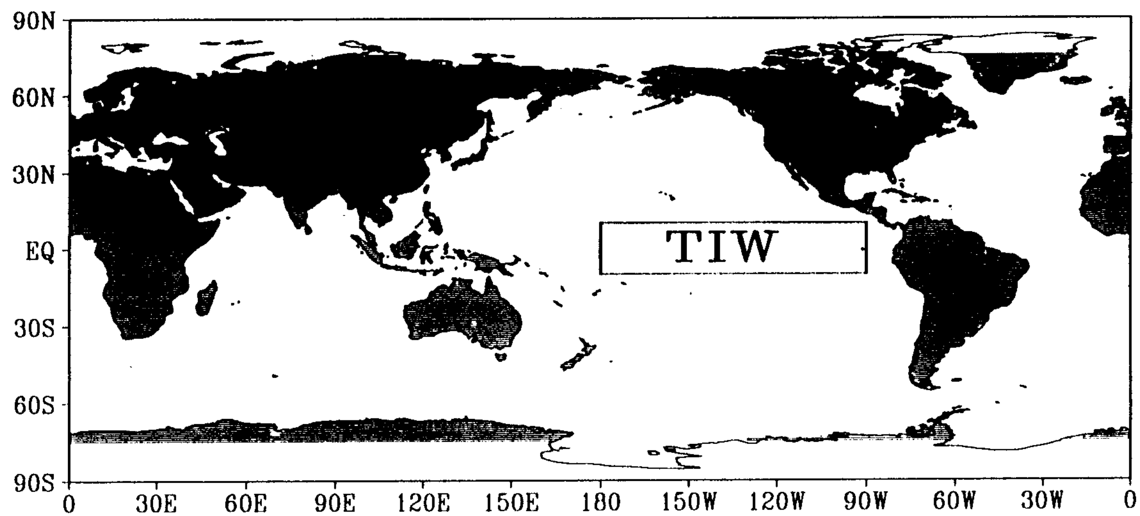
European Geophysical Society Meeting at Nice


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


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

(a)

| Parameter | SST | U | V | LH |
|---|---|---|---|---|
| Percentage | 56% | 24% | 40% | 39% |
| Parameter | WV | WC | WS | |
| Percentage | 23% | 50% | 49% | |

(b)

| Parameters | SST & U | SST & V | SST & WC |
|---|---|---|---|
| Phase diff. | -155° | -11° | -70° |
| Parameters | SST & WS | WC & WV | SST & LH |
| Phase diff. | 14° | 18° | 7° |

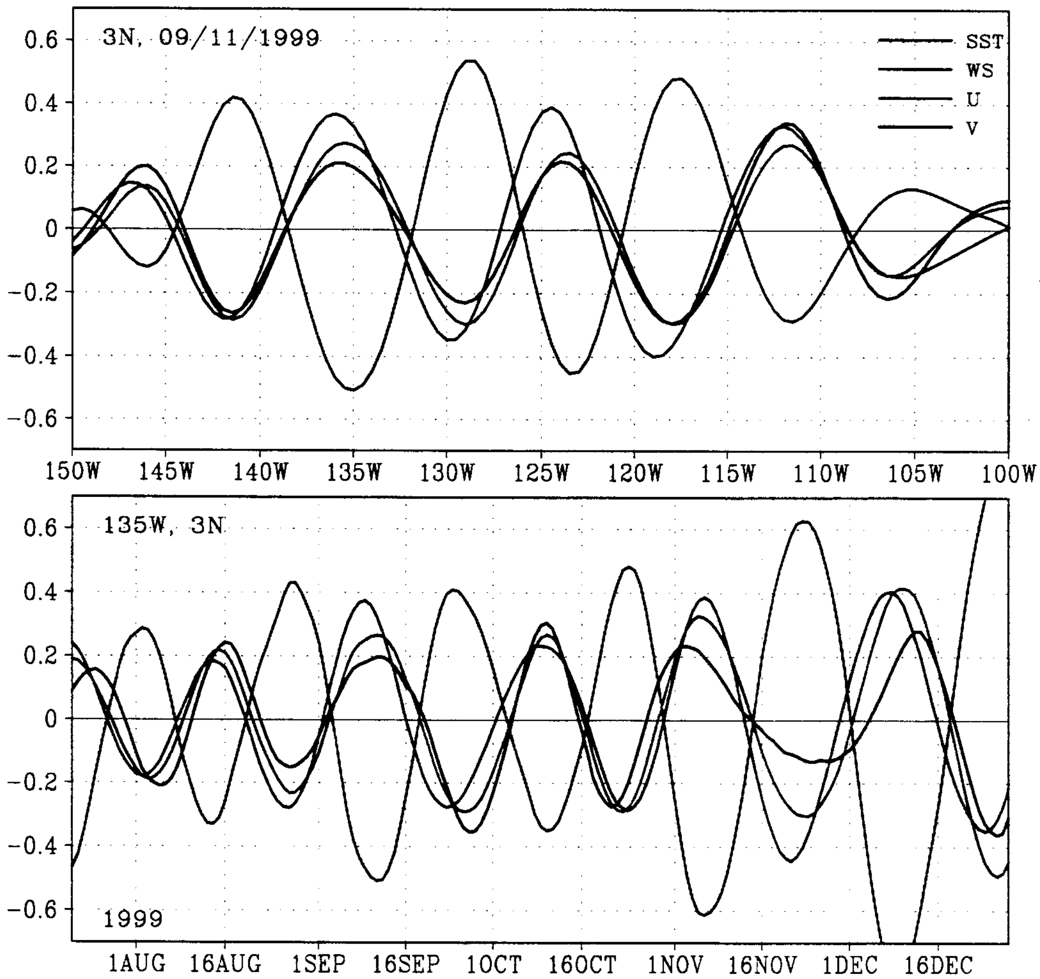

3N, 09/11/1999
SST
WS
U
V
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
150W
145W
140W
135W
130W
125W
120W
115W
110W
105W
100W
135W, 3N
1999
1AUG
16AUG
1SEP
16SEP
1OCT
16OCT
1NOV
16NOV
1DEC
16DEC

Figure 1:

# Conclusion

• QuikSCAT and TMI reveal the atmospheric manifestation of tropical instability waves north of the Pacific equatorial cold tongue.

• The phase differences between the propagation of wind and sea surface temperature signals are consistent with the hypothesis that the coupling between wind and SST is caused by buoyancy instability and mixing, which reduces the wind shear in the atmospheric boundary layer.

• Vertical wind profiles measured from a research ship provide further support to the hypothesis

• The coupling causes higher evaporative cooling over the warm phase and infers a negative thermal feedback.