Cloud structure anomalies over the tropical Pacific: CCM3 versus observations

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**Objective**


**Procedure**

Employ output from a simulation with CCM3 employing prescribed SSTs, so that the two El Niños are imposed through the SST boundary condition.

**Study Regions**

Western: 5°S to 10°N and 100°E to 170°E  
Eastern: 7.5°S to 7.5°N and 200°E to 280°E
Data

The data include the strong 1997/98 El Niño and the weaker 1987 event.

CRF at the top-of-the-atmosphere (TOA) from the Earth Radiation Budget Experiment (ERBE) for 1985 through 1989, and Cloud’s and the Earth’s Radiant Energy System (CERES) for the first four months of 1998. The ERBE data are likewise restricted to the first four months of each year.
Monthly-mean Gridded Data

Western

1985

N = -(SW CRF)/(LW CRF)

Net CRF (Wm$^{-2}$)

Eastern

Normal Year

1987

N = -(SW CRF)/(LW CRF)

Net CRF (Wm$^{-2}$)

1998

N = -(SW CRF)/(LW CRF)

Net CRF (Wm$^{-2}$)
Monthly-mean Gridded Data

ERBE/CERES

1985 West

N = -(SW CRF)/(LW CRF)

Net CRF (Wm\(^{-2}\))

CCM3

1985 West

N = -(SW CRF)/(LW CRF)

Net CRF (Wm\(^{-2}\))

1987 West

N = -(SW CRF)/(LW CRF)

Net CRF (Wm\(^{-2}\))

1998 West

N = -(SW CRF)/(LW CRF)

Net CRF (Wm\(^{-2}\))

1998 West

N = -(SW CRF)/(LW CRF)

Net CRF (Wm\(^{-2}\))
\[ N = - \frac{\text{SW CRF}}{\text{LW CRF}} \]

West

- LW CRF (W/m²)

Year

- SW CRF (W/m²)

Year

East

- LW CRF (W/m²)

Year

- SW CRF (W/m²)

Year

CCM3

ERBE/CERES
CONCLUSIONS

Western Region

CCM3 does an excellent job of replicating the observations of SW CRF, LW CRF and N, with the exception on 1998 for which it underestimates both the reduction in average cloud altitude and cloud amount as induced by the El Niño.

Eastern Region

CCM3 does a poor job of replicating the observations of both SW CRF and N, with the best agreement coinciding with the two El Niños. For LW CRF, on the other hand, CCM3 does quite a good job, because of compensating errors in cloud amount and vertical structure.