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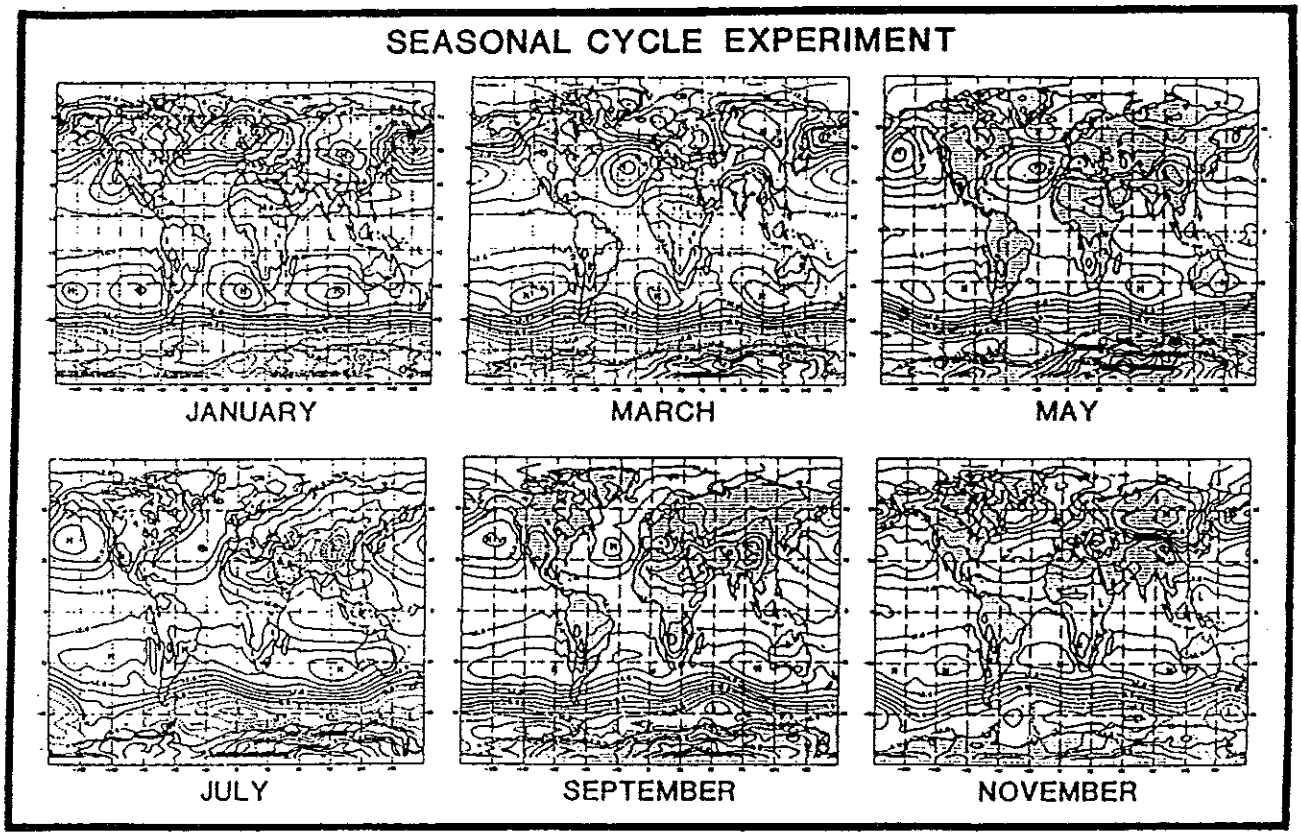

GLOBAL MODELING AND SIMULATION BRANCH

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PERSISTENT ANOMALIES OF THE SOUTHERN HEMISPHERE CIRCULATION

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We have examined the persistent features of large anomalies and determined the locations and structures of blocking in the Southern Hemisphere. The data set used here contains daily maps of 500 mb geopotential heights for 100 months (June 1, 1972 to Nov. 30, 1980), covering from 10S to 90S. The seasonal cycle was defined as an 8-year mean and the 8th (annual) and 16th (semiannual) Fourier components of the time series at each grid point. Anomalies were defined as the difference between the total field and the seasonal cycle for each point.

The primary conclusions of this study are:

1. Large anomalies are less persistent in the Southern Hemisphere than in the Northern Hemisphere.

We have calculated the frequency of occurrence of anomalies ($\geq$ 150 m or $\leq$ -150 m) which persisted for a certain number of days. There is no evidence of any discontinuity in either positive or negative anomaly curves. The peak near 2-3 days noted by Charney, Shukla and Mo (1980) due to synoptic scale travelling disturbances does not exist here. This indicates that most of the large anomalies do not persist more than one day at any grid point.

2. The local one day lag autocorrelation decay much faster in the Southern Hemisphere. Except in the subtropics and Australia, the red noise model fits the autocorrelation decay well.

3. The frequency of occurrence for positive anomalies satisfying the criterion (150 m, 6 days) is similar to the map of 8-64 days low pass filtered variances, and the frequency distribution for anomalies satisfying the criterion (150 m, 1-3 days) represents storm track patterns.

Figures 1a and 1b show the frequency of occurrence of persistent positive and negative anomalies satisfying the criterion (150 m, 6 days) using 100 months of data, respectively. Figure 1a is similar to that presented by Swanson and Trenberth (1982) using the criterion (100 m, 5 days). There are three maxima located in the southwest Pacific along 55S near 170W and between 140E-150E, southeast of South America (65S, 80W) and (50S, 80E) Indian Ocean.

4. The maxima of frequency of occurrence of large positive anomalies and large negative anomalies do not occur in the same region.

Comparison of Figures 1a and 1b shows that the maximum in Pacific (55S, 160W) remains in both cases. The one located in the south of southern America shifts to (66S, 45W). The maximum at the Indian Ocean does not exist in Figure 1b.

Blocking is defined as an anomaly which satisfies criterion ($\pm$ 150 m, 6 days) and associates with a pronounced ridge. According to this definition, we have identified the blocking events, ridge positions and structures of each event. There are 13 events located in the southwest Pacific, four events in the south of South America. There is not blocking at (50S, 80E), where the maximum of the frequency of occurrence of positive anomalies occurs. However, further south at 60S, there are three events in the Indian Ocean.

REFERENCES

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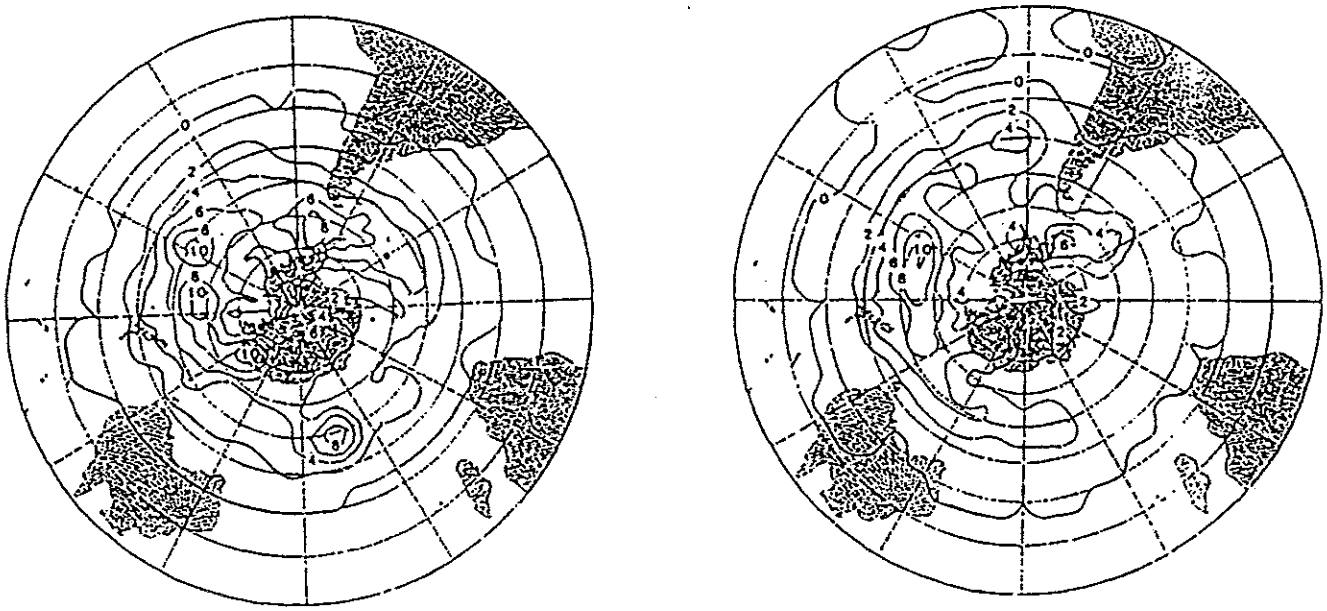
Swanson, G. S., and K. E. Trenberth, 1982: Persistent anomaly statistics in the Southern Hemisphere. preprint.



(a) (b)

Figure 1. Number of events for anomalies satisfying the criterion: a) 150 m, 6 days, b) -150 m, 6 days. Contour interval 2.