Monthly Weather Review: **Vol. 101, No. 1, pp. 58–68.**

Remote Forcing of the Time-Independent Tropical Atmosphere

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(Manuscript received March 7, 1972, October 27, 1972

ABSTRACT

An analysis is made of low-latitude, large-scale, zonally asymmetric motions that result from the influence of stationary extratropical disturbances. A linear, two-layer, primitive-equation model in spherical coordinates with parameterized dissipation and realistic basic flows is used. Midlatitude effects are included by applying conditions at the lateral boundaries of the model near 40°N and 40°S.

A series of hypothetical cases is considered in which the roles of dissipation and various basic fields are studied for their effect on the equatorward propagation of energy. The interaction of seasonal forcing functions and basic states in December, January, and February and in June, July, and August is studied. The response near the Equator is found to depend on both the basic state and the magnitude of the forcing, although generally the midlatitude effects dominate the subtropics, whereas local forcing is of greater importance in low latitudes.

A comparison of the computed composite state of the tropical atmosphere (due to both local and remote forcing) with observed fields and previous studies indicates a successful simulation of many features of the seasonal mean tropical atmosphere.