

A Study of Warm Season Blocking over the Pacific

David Small, Eyad Atallah and John Gyakum,
Department of Atmospheric and Oceanic Sciences,
McGill University, Montreal, QC.

Abstract

After more than 60 years and hundreds of studies, blocking remains a significant challenge to weather and climate forecasting. Most studies of blocking have tended to identify winter and spring as the peak seasons for blocking activity in the central Pacific and western Atlantic, leading most researchers to focus on understanding the dynamics and predictability of cold season events. Recent summer blocking events implicated in extreme heat waves, floods and fires raise the question of how often blocking occurs in summer. Because there is no generally accepted index of blocking, the question of how often blocking events trigger heat waves, droughts and floods in the warm season is difficult to answer.

In this study, we describe a modified blocking index based on the vertically integrated potential vorticity that is able to identify blocking events over the Pacific in all seasons. As with previous studies, our results suggest that the seasonal frequency of blocking in the Pacific peaks in winter and is significantly smaller in summer. A monthly analysis of blocking frequency, however, uncovers an interesting pattern of intra-seasonal variability that is not identified by a seasonal average. The monthly analysis indicates that blocking is as frequent in August and September as in the winter or spring, raising the possibility that tropical cyclone activity might contribute to the high frequency of blocking events in the late summer and early fall. Case studies of summer blocking events with different precursors are presented to demonstrate the strength of the index and the variety of dynamics that produce blocking events over the Pacific. Trends in blocking activity are also discussed.