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REMOTE FEATURES LINKED TO THE SOUTH PACIFIC SUBTROPICAL HIGH

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1. INTRODUCTION

This study follows up work reported on by the author in Santiago Chile at the last ICSHMO meeting. At that meeting calculations using *monthly-mean* NCEP/NCAR reanalysis and other data showed links between the subtropical high in the eastern South Pacific (hereafter, the 'Chilean' high) and remote areas of precipitation and outgoing longwave radiation (OLR) anomalies. Interactions with the intertropical convergence zone (ICZ), far western equatorial Pacific, and midlatitude regions proved significant. These links in the monthly mean data are consistent with several, but not all, theoretical forcing mechanisms proposed for the subtropical highs. The monthly mean data also suggested that the side of the subtropical high closed to the remote forcing was more greatly influenced than were other sides. The data suggested that multiple forcings are affecting the subtropical high strength.

Our recent work has considered daily data. Unlike the monthly mean data shown before, the daily mean fields allow study of cause and effect between the several different types of remote events that subsequently influence the 'Chilean' high.

Seasonal grouping of the data for the 'Chilean' high is not as easy as for the subtropical high in the North Pacific (the 'California' high. The 'California' high not only has a stronger seasonal variation, its maximum values occur during the summer months (Fig. 1). In contrast, there are two maxima in monthly means of the Chilean high. Furthermore, the larger central pressures occur during spring months. The seasonal trend in the daily data poses some problems.

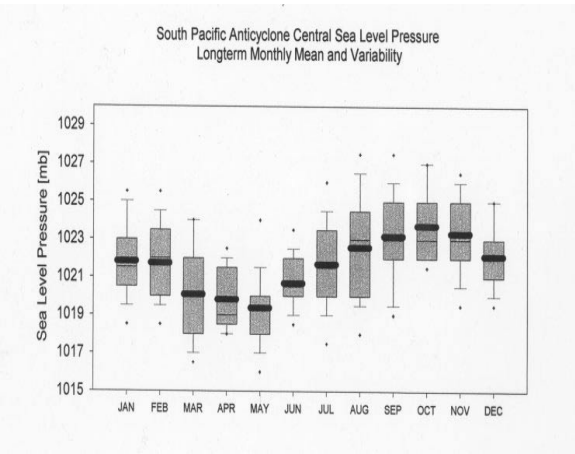

Fig. 1. 'Bar and whisker' plot of montly mean central pressure for the 'Chilean' high using 1979-1999 data. The darkest line is the monthly mean; the lighter the median. The boxes enclose the middle 2 quarties. The whiskers extend 2 standard deviations. The extreme values are marked with '+' symbols.

2. DAILY DATA PRELIMINARY RESULTS

NCEP/NCAR Reanalysis data used in this study were provided by NOAA-CIRES Climate Diagnostics Center, Boulder, Colorado, USA, from their Web site at http://www.cdc.noaa.gov/. In this report, only sea level pressure (SLP) and interpolated OLR data are shown. More information can be found at: http://atm.ucdavis.edu/~grotjahn/Subhi/WIlngtn/

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1-point lag correlation plots are shown in Fig. 2 for a point just N of the average center of the 'Chilean' high. The correlation point is SLP data, the 2-D field is OLR. The correlations are consistent with monthly data showing each remote forcing tending to have stronger influence on the side closest to the forcing.

Correlation points NW, N, and NE of the subtropical high center are correlated with a broad band across the equatorial Pacific. Higher SLP at these points is correlated most with high OLR near the intersection of the dateline and the equator. Correlations exceed 0.3 over a broad range of lags (0-12days). This consistency explains why this region had high correlation (>0.6) in the monthly mean data. This region also has significant correlation with other points to the W and even S of the high center.

Higher SLP for correlation points to the NE of the high center were correlated low OLR over Amazonia; the largest region of significant correlation occurs with lag of 1-2 days while after 5 days an eastward shift of the south Atlantic cloud band seems apparent. These correlations with Amazonia remain small, <0.3 at all times.

On the south side of the high, higher SLP is associated with higher OLR in the immediate vicinity and only for short lags (0-2 days). Just SE of the high center has high SLP correlated (up to 0.5) with high OLR for short lags. High OLR is E of the correlation point at 0 lag and W of the point by 2 days.

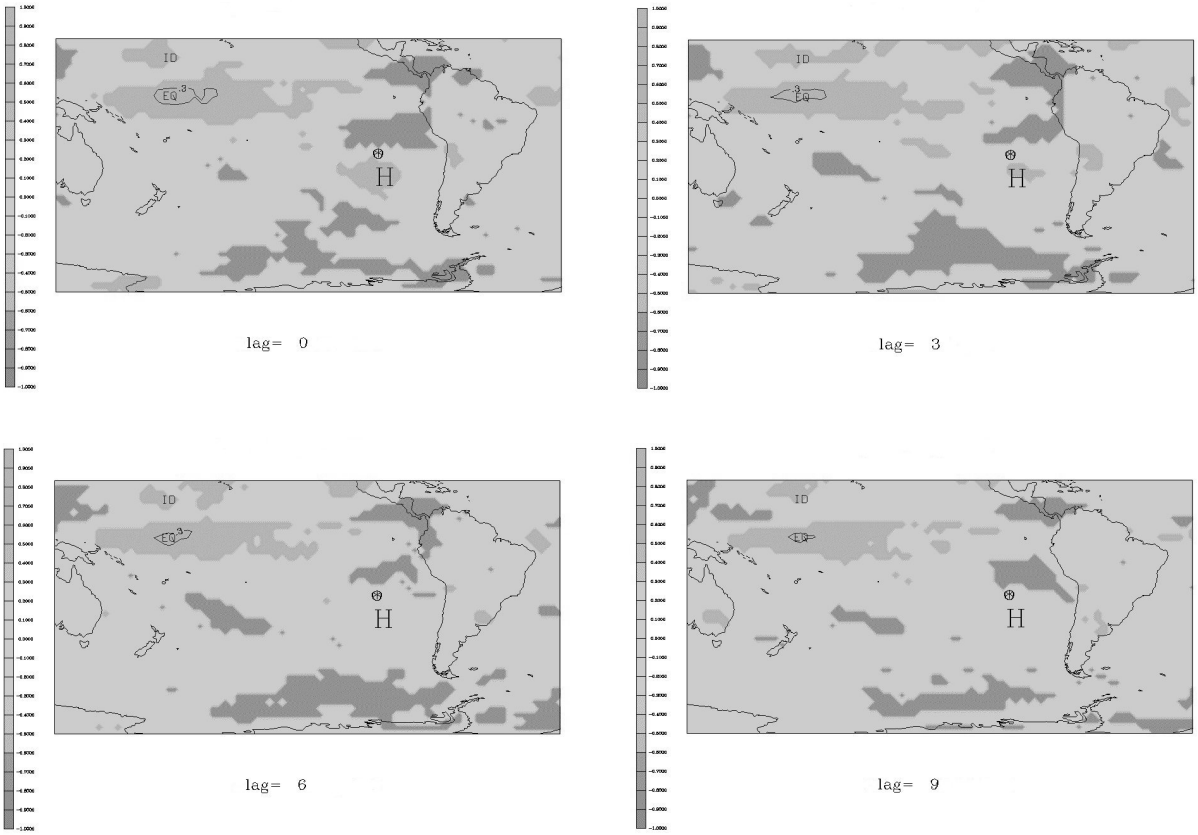

Fig. 2. 1-point correlations between 2-D field OLR and SLP at the point marked by the circled *. 'H' marks the average location of the peak value of SLP in the December, January, February data from 1/1990-2/2002. Areas passing a 1% t-test are shaded. Lighter shading (cyan) indicates high OLR with high SLP, darker shading (brown) means low OLR with high SLP.