Interdecadal Shifting of the North Pacific Jet Stream — El Niño Events

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Abstract

Researchers have shown a step-like increase in worldwide sea surface temperatures (SSTs) in the mid-1970s. Wintertime (December through March) polar-front jet stream positions in the North Pacific will be presented for six moderate-to-very-strong El Niño events — three before the winter of 1975-76 (1965-66, 1968-69, 1972-73) and three after (1982-83, 1986-87, 1991-92). The wintertime El Niño jet stream patterns before 1975-76 were similar across the North Pacific, and the patterns after 1975-76 were also similar. However, composites of the two sets are very different, revealing a significant interdecadal shift in the polar-front jet stream during El Niño events. Jet stream positions before 1975-76 were north of the wintertime mean jet stream pattern but have been south of the mean jet since 1975-76.

The jet stream composites suggest that changes in the overall level of SSTs can have dramatic effects on the wavelength of the mean jet stream pattern across the Pacific. The trough axis remained fixed at 130°E in the western Pacific before and after 1975-76. However, the jet stream ridge axis during El Niño events shifted westward to 150°W longitude before 1975-76 and eastward to 120°W after 1975-76. The connection between changes in SSTs and the subsequent effect on upper-air longwave patterns will be discussed, along with probable impacts of these jet stream shifts on California rainfall.