

Response of Pacific Northwest Vegetation to Large-Scale Changes in Climate During the Last 100,000 Years

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Abstract

Paleoclimatic variations in western North America depend on a hierarchy of temporal and spatial controls that can be examined using a combination of modeling studies and data synthesis. A particular record reflects the superimposition of multiple controls that operate on a variety of temporal and spatial scales; identification of these controls is not necessarily straightforward. The regional vegetation response to large-scale changes in the climate system of the last 21,000 years is used as a conceptual model to help explain earlier vegetation and climate at two localities. Carp Lake (Lat. 45°55'N, Long. 120°53'W, elevation 714 meters) provides a pollen record of the past about 75,000 years based on 12 radiocarbon ages and 11 tephra layers. The early Wisconsin period (about 75,000-68,000 years ago) supported mixed conifer forests indicative of cool, wet conditions. The early mid-Wisconsin (about 60,000-50,000 years ago) featured oak, hemlock, Douglas fir, and fir during a period of cool dry summers, cool wet winters, and higher-than-present summer insolation. The mid-Wisconsin (about 68,000-25,000 years ago) registered alternating pine forest and open pine-dominated parkland that imply cooler-than-present conditions. Little Lake (Lat. 44°10'N, Long. 123°35'W, elevation 217 meters) provides paleoenvironmental information for the past 42,000 years in the central Coast Ranges (Worona and Whitlock, in press). From about 42,000 to 24,000 years ago, open forest of pine, western hemlock, and fir indicate that summers were cooler and more humid than present.