Late glacial stage and Holocene tropical ice core records from Huascarán, Peru

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Between 1990 and 1992 a survey of five glaciers located north-south along the Cordillera Blanca was conducted to identify the best sites for acquiring longer-term paleoclimatic and environmental records. In addition, satellite-linked automatic weather stations were established on two of the sites, Hualcán and Pucahirca, to record current meteorological conditions at the top of the Andes. The col of Huascarán (9o06'41" S; 77o36'53" W), the highest (6048 m a.s.l) and coldest of the sites, was selected for drilling to bedrock as shallow cores from all five sites confirmed that it contained the best preserved stratigraphic records. In 1993 two ice cores were drilled to bedrock using a portable, light-weight, solar-powered thermal drilling system. Core 1 (C1), 160.4 m long (152.41 m ice eq.), was cut in the field into 2677 samples, which were melted and poured into bottles and sealed with wax. Core 2 (C2), 166.1 meters long (158.44 m ice eq.), was returned frozen to The Ohio State University, where it was cut into 4675 samples. Samples from both cores were analyzed for microparticle concentrations (dust), chloride (Cl-), nitrate (NO3-) and sulfate (SO42-) concentrations, and 18O and D.

This paper gives an abstract of the results from the Huascaran cores.

Abstract

Two ice cores from the col of Huascarán in the northcentral Andes of Peru contain a paleoclimatic history extending well into the Wisconsinan (Würm) Glacial Stage and include evidence of the Younger Dryas cool phase. Glacial stage conditions at high elevations in the tropics appear as much as 8-12°C cooler, the atmosphere was 200 times dustier, and the Amazon Basin forest cover may have been 40 to 50% less extensive. Differences in both 18O (8 per mil) and deuterium excess (4.5 per mil) from the Late Glacial Stage (LGS) to the Holocene are comparable with polar ice core records. These data imply that the tropical Atlantic was possibly 5-6°C cooler during the LGS, that the climate was warmest from 8400 to 5200 yr BP, and that it cooled gradually culminating with the Little Ice Age (200-500 yr BP). A strong warming has dominated the last two centuries.

Notes to readers

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