

Georges, C. and G. Kaser (2002): Ventilated and unventilated air temperature measurements for glacier-climate studies on a tropical high mountain site. *Journal of Geophysical Research*, 107(D24), 4775, doi:10.1029/2002JD002503.

Abstract

In this paper, artificially ventilated and unventilated temperature measurements logged by high-elevation automatic weather stations (AWS) in the tropical Cordillera Blanca, Perú, are compared. Both temperatures are measured with the same sensor and radiation shield by periodic artificial ventilation. The analyzed time series range from October 1999 until May 2001. The temperature differences $T = T_{\text{unvent.}} - T_{\text{vent.}}$ show a persistent daily cycle with a nighttime mean value of 0.3 K and a daytime mean of 1.3 K. The daytime period of T is characterized by a late morning and an early afternoon maximum and a slight secondary noon minimum. The cycle is most pronounced during the dry season, but is only slightly reduced in the wet season. It is shown that the daily cycle is mainly caused by incoming shortwave radiation and that the resulting temperature difference depends on the irradiation angle to the radiation shield. A simple radiation geometry model is proposed for the explanation of T . The modeled T daily cycle strongly correlates with measured monthly mean T daily cycles and can be used for respective corrections. In case of snow cover, the general cycle of T remains, but additional deviations are caused by reflected shortwave radiation. These deviations cannot be modeled by using simple considerations. Therefore adequately ventilated air temperature measurements on glaciers and snow-covered surfaces should be made. Natural ventilation suffices in the case of persistently high wind speeds; otherwise, artificial ventilation should be implemented whenever possible.