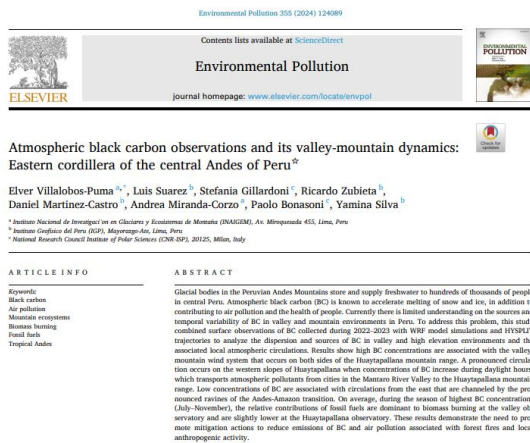




Atmospheric black carbon observations and its valley-mountain dynamics: Eastern cordillera of the central Andes of Peru



Enlace
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1. Introduction

Atmospheric black carbon (BC) is a short-lived atmospheric pollutant that remains for days and weeks during its transport from regional sources (Puriner et al., 2019). BC is produced from the incomplete combustion processes of fossil fuels, biofuels, and biomass (Bond and Bergstrom, 2006; Bond et al., 2013). In the atmosphere, BC is one of the positive factors increasing warming of the lower troposphere because of its high energy absorbing capacity (Puriner et al., 2019; Xu et al., 2020) and contributes to the negative health effects of air pollution (Molina et al., 2015; Puriner et al., 2019; Colarossi et al., 2022). When BC is deposited on the surface of glaciers they act as light absorbing particles (Kang et al., 2009; Liu et al., 2020), generating warmer surface temperatures and leading to an accelerated retreat of snow and ice that

lead to glacial retreat (Réveillet et al., 2022). The overall effect of this process is the reduction of the albedo, which triggers further warming. The quantification of BC presents uncertainty and limitations due to the complexity of chemical and physical processes, as well as the scarcity of existing techniques and methodologies. These limitations do not allow for an accurate representation of carbonaceous aerosols in chemical-atmospheric and radiative transfer models (Kaskaoutsis et al., 2021).

Aerosol Optical Depth (AOD, < 2.5 μm) data show the mountain and valley areas of the Central Andes of Peru have high concentrations of BC from July to November with a peak in September (Castillo et al., 2015). Three possible sources of BC emissions include the Pacific and Atlantic slopes of the Andes Mountains and the inter-Andean valleys. The distribution pattern from the Pacific slope is associated with nighttime flows

