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Tracers of High Altitude Pollution Sources and Impact on Mt. Kenya Ecosystem

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Tracers of pollution sources have been used in atmospheric studies to track sources of long distance transported particulate aerosols in the lower and middle troposphere. To identify the sources of suspected pollutants that are responsible for the degradation of glaciers on Mt. Kenya the tracers were used in this study. Mt. Kenya is one of the major sources of water in Kenya and therefore important in sustaining underground and river water levels. Its ecosystem is therefore important in sustainable economic growth, food production and poverty eradication. However Kenya have been experiencing reduction in river water levels and drying of many wetlands resulting in extended arid lands, especially in the neighborhood of semiarid areas. Strong winds and convective systems are known contribute mineral dust particles in the middle troposphere. This species of aerosol particles have an estimated lifetime of weeks and can be transported for long distances, for example the impact of Saharan dust in the Atlantic Ocean and America. The semiarid lands and increasing anthropogenic activities, especially cultivation, within the fast increasing population in Kenya were suspected of impacting on Mt. Kenya ecosystem. However tracing of the sources that contributed to pollution at that altitude remained inhibited due to scanty measurements in the region. In March 2015, during a period of dry and hot conditions, which preceded the long rains, a measurement campaign was carried out at a site on the south-south eastern slopes of Mount Kenya. The site location is at the Equator, at more than 4.7 km above sea level (asl) and is characterized by tropical alpine highland glacier in the neighborhood of high mountain peaks of heights ranging from 4985 to 5199 m asl and Lakes. The campaign mobilized gas and particle monitors, which included a black carbon monitor, and battery powered particle samplers. Gravimetric measurements of collected airborne particles on Teflon filter media; the elemental constituents of those particles, glacier snow/ice and water were used as tracer properties for assessing the source on pollution impacting the site. Water, snow and ice samples were collected into pre-cleaned plastic containers. The filter samples were analyzed using convectional EDXRF spectrometer and the samples of water, snow and ice by TXRF at the Institute of Nuclear Science and Technology, University of Nairobi in Kenya. On filter samples Ca, Ti, Cr, Mn, Fe, Ni, Cu, Zn and Pb; the abundant elements were Ca, Ti, Mn, Fe and Zn and in glacier snow, ice and water it was Mn, Ca, Ti and Fe. These analyzed elements are common tracers of mineral dust thus implicating local and distance arid lands and anthropogenic activities as sources of pollution that contribute to the degradation Mt. Kenya ecosystem. However more comprehensive studies are necessary, despite the difficult terrain and conditions.

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Country/Organization invited to participate

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