Apportionment of black carbon in the South Shetland Islands, Antarctic Peninsula

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Abstract

Simultaneous time series measurements of black carbon (BC), aerosol particle number (ANC), radon, and SEM-EDS analysis for total carbon were collected at the Brazilian Antarctic station Ferraz, northwest of the Antarctic Peninsula (62°05'S, 58°23.5'W) for the years of 1993, 1997, and 1998. A new data screening technique was applied in an effort to distinguish long-range from local contaminations of BC. Analyses of data revealed a small increase in BC concentration during winter-to-spring seasons. The mean annual BC concentration of 8.3 ng m⁻³ was consistent with global model estimates for this region. The intermittent coupling mechanism between the regional circulation of the low-level jets and the passages of the frontal systems explained the transport of BC from areas of burning biomass in Brazil to the northern Antarctic Peninsula. Principal component analysis applied to BC, Radon, ANC, and meteorological data presented significant factor loadings linking BC with ²²²Rn and
with wind velocity corroborating with this hypothesis.

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