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Light absorption and fluorescence characteristics of water-soluble organic compounds in carbonaceous particles at a typical remote site in the southeastern Himalayas and Tibetan Plateau

Chao Zhang[1,5], Meilian Chen[2], Shichang Kang[3,4,5], Fangping Yan[3,6], and Chaoliu Li[3,4]

[1]Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Key Laboratory of Tibetan Environment Changes and Land Surface Processes, Beijing, China

[2]Environmental Program, Guangdong Technion-Israel Institute of Technology, Shantou, China

[3]State Key Laboratory of Cryospheric Science, Northwest Institute of Eco-Environment and Resources, Chinese Academy of Sciences, Lanzhou, China

[4]CAS Center for Excellence in Tibetan Plateau Earth Sciences, Chinese Academy of Sciences, Beijing , P.R. China

[5]University of Chinese Academy of Sciences, Beijing , China

[6]LUT School of Engineering Science, Lappeenranta University of Technology, P.O. Box 20, Lappeenranta, Finland

Carbonaceous particles play an important role in climate change, and the increase in their emission and deposition causes glacier melting in the Himalayas and the Tibetan Plateau (HTP). This implies that studying their basic characteristics is crucial for a better understanding of the climate forcing observed in this area. Thus, we investigated characteristics of carbonaceous particles at Yaze village, a typical remote site of southeastern HTP. The results showed that the organic carbon and elemental carbon concentrations at this study site were 1.86 ± 0.84 and 0.18 ± 0.09 μg m^{-3}, respectively, which were much lower than those reported for other frequently monitored stations in the same region. Thus, these values reflect the background characteristics of the study site. Additionally, the absorption coefficient per mass (α/ρ) of water-soluble organic carbon (WSOC) at 365 nm was 0.60 ± 0.19 m^2 g^{-1}, which was lower than those reported for other remote stations in the HTP. This value could be attributed to a lower and higher contribution of mineral dust and secondary organic carbon, respectively. Multi-dimensional fluorescence analysis showed that the WSOC consisted of approximately 37% and 63% protein and humic-like components, respectively, and the latter was identified as the determining component of light absorption ability of the WSOC. Combined the significant relationships between WSOC and sulfate ion, potassium ion, and nitrate ion with the air masses at the study site originated primarily from South Asia, it is suggested that the levels of carbonaceous particles in Yaze village were predominantly influenced by emissions from South Asia.