Optical properties and chemical components of atmospheric aerosols observed at Amami-Oshima in the spring of 2003 and 2005

[*1]S. Sudo, [*1]S. Yonemura, [*2]H. Tsuruta, [*2]Y. Wakabayashi, [*2] D. Gotoh, [*2]T. Nakajima
[*3]Y. Shirasuna, [*3]K. Hirano, [*4]K.Sera, [*5]S.Futatsugawa, [*6]Y.Saitoh, [*7]M. Yabuki, [*8]D. Zhang
[*9]T. Maeda, [*10]K. Aoki, [*11]N. Kikuchi, [*12]S. Katagiri, [*12]T. Hayasaka, [*13]T. Takamura
[*14]Y. Tanaka and [*14]D. Komori

[*1]NIAES, 3-1-3 Kannondai, Tsukuba, Ibaraki 305-8604, Japan
[*2]CCSR, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8568, Japan
[*3]Yokohama City Institute of Environmental Sciences, 1-2-15 Takigashira, Yokohama 235-0012, Japan
[*4]Cyclotron Research Center, Iwate Medical University, 348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan
[*5] Japan Radioisotope Association, 2-28-45 Honkomagome, Bunkyo, Tokyo 113-8941, Japan
[*6]Takizawa Institute, Japan Radioisotope Association, 348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan
[*7]National Institute of Polar Science, 1-9-10 Kaga, Itabashi, Tokyo 173-8515, Japan
[*8]Prefectural University of Kumamoto, 3-1-100 Tsukiide, Kumamoto, Kumamoto 862-8502, Japan
[*9]AIST, 16-1 Onogawa, Tsukuba, Ibaraki 305-8569, Japan
[*10]Toyama University, 3190 Gofuku, Toyama, Toyama 930-8555, Japan
[*11]JAXA-EORC, 1-8-10 Harumi, Chuo, Tokyo 104-6023, Japan
[*12]RIHN, 457 Kamigamo-motoyama, Kita, Kyoto 603-8047, Japan
[*13]CeRES-Chiba University, 1-33 Yayoicho, Inage, Chiba Chiba, 263-8522, Japan
[*14]TITECH, 4259 Nagatsutacho, Midori, Yokohama 226-8503, Japan

Abstract

An intensive field program was performed to measure atmospheric aerosols at Amami-Oshima, southwest Japan, during 15 March-16April 2003 (APEX-E3), and 7-25 March 2005 (ABC-EAREX2005) under the APEX and ABC-EAREX project, respectively. Chemical analysis of the collected aerosols with the three or four size ranges was made for elemental and organic carbons (EC/OC) by improved method, water soluble ions by ion chromatography, and trace elements by PIXE. For optical measurements, aerosol absorption coefficient and scattering coefficient were measured by a particle/soot absorption photometer and an integrating nephelometer, respectively. For further analysis of single scattering albedo (SSA), SSAo was calculated after the correction for the scattering and absorption coefficient. On the other hand, SSAc from chemical composition was also calculated by the six chemical components (EC, OC, $(NH_4)_2SO_4$, NO_3, sea-salt particles, and soil mineral dusts) obtained by chemical analysis of fine and coarse particles collected on the filter at the sampling site. Backward trajectory analysis was performed for identifying the source region of aerosols that arrived at the sampling site. The air masses arrived at Amami were divided into four wind sectors; W1) East coast of China and the inland area such as Mongolia, W2) Korean Peninsular and northeast China, W3) the Japan Islands, and W4) west Pacific Ocean. EC, OC, and $(NH_4)_2SO_4$ in fine particles ($PM_{2.5}$), and soil dusts in coarse particles were highest

in the W1 sector. The soil dusts were much higher in the period of dust storms than in the other periods. The SSAc was in a range of 0.88-0.98, much higher than the original SSAo. After the original SSAo was corrected, the difference between SSAc and SSAo became small (<0.05). However, the SSAo was lower than the SSAc when dust storms arrived at Amami on 18 March 2005, while it was nearly equal to the SSAo during the other dust storm event (13-15 April 2003).