Cosmic ray-induced aerosol formation in an upper tropospheric intercontinental pollution plume.

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Abstract

cosmic ray-induced aerosol formation was observed in an upper tropospheric intercontinental pollution plume which probably contained elevated concentrations of SO$_2$ and sulfuric acid. Negative and positive ion size distributions were measured by an air craft-based large ion-mass spectrometer (LIOMAS). During interception of the plume (at altitudes around 8000 - 9000 m) both negative and positive large ions were observed by LIOMAS. These large ions were formed by uptake of supersaturated atmospheric gas molecules probably H$_2$SO$_4$. Our measurements indicate a total concentration of such molecules of up to 2 · 10$^6$ cm$^{-3}$. This concentration allows rapid condensational growth of freshly nucleated small aerosol particles even up to the size of cloud condensation nuclei.