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## Evolution of the Raikoke volcanic plume in the Northern Hemisphere UT/LS over 9 months past eruption as seen from IAGOS-CARIBIC in-situ observations

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IAGOS (In-Service Aircraft for a Global Observing System; [www.iagos.org](http://www.iagos.org)) is a European Research Infrastructure which uses passenger aircraft equipped with autonomous instrumentation for the continuous and global-scale observation of atmospheric composition in the upper troposphere and lowermost stratosphere (UT/LS; see Petzold et al., 2015). Among others, IAGOS provides today detailed information on atmospheric trace species by the flying laboratory in IAGOS-CARIBIC. Since July 2018, number concentration and fraction of non-volatile particles for  $d_p > 15$  nm as well as size distributions for  $d_p > 250$  nm are measured (Bundke et al., 2015). Since lately, aerosol chemical composition is provided as well (Schulz et al., 2020). IAGOS-CARIBIC flight routes covered during the period from July 2018 to March 2020 include regular flights from Munich, Germany, to North America, East Asia and South Africa.

On 22 June 2019, the Raikoke Volcano on the Kuril Islands erupted and transported vast amounts of gaseous and particulate matter into the UT/LS. Two months after the eruption CALIPSO observed enhanced aerosol optical depth and aerosol scattering across the entire lower stratosphere. IAGOS-CARIBIC conducted several flight series in the Northern Hemisphere before and after the eruption phase such that the pre- and post-eruption data provide profound information on the impact of the Raikoke eruption on the Northern Hemisphere UT/LS aerosol and the evolution of the plume during 9 months of regular observation.

Data indicate an increase in the number concentration of particles with  $d_p > 250$  nm by a factor of 10 across the entire sampled altitude range, while the increase of the total aerosol number concentration ( $d_p > 15$  nm) is less pronounced but also significant. We present a detailed analysis

of the changes in UT/LS aerosol load and properties caused by the Raikoke eruption, including the temporal evolution of the aerosol plume during 9 months past the eruption. In-situ observations are backed-up by CALIPSO products and results from associated volcanic plume modelling studies deploying the UK Earth System Model UKESM1.

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Schulz, C., et al. (2020) EAC 2020 Abstract ID 1258