

Detection of an enhanced stratospheric aerosol layer above Europe one year after the eruption of the volcano Raikoke

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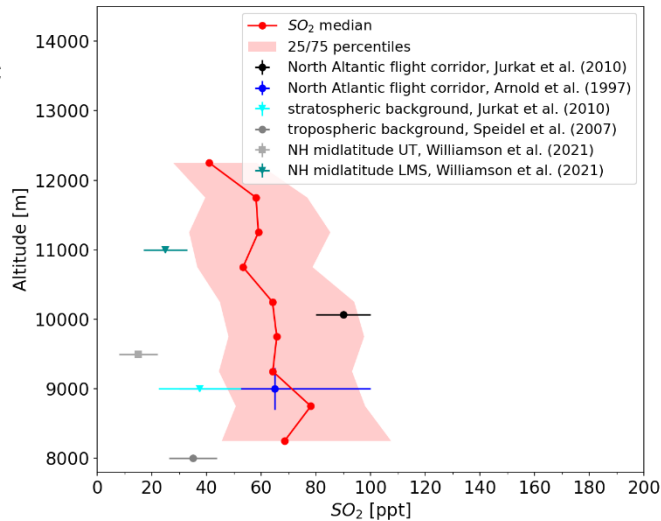
Bluesky

- Airborne mission over Europe and the North Atlantic during the COVID19 lockdown in May/June 2020

Bluesky details in EGU21-13134 by Christiane Voigt

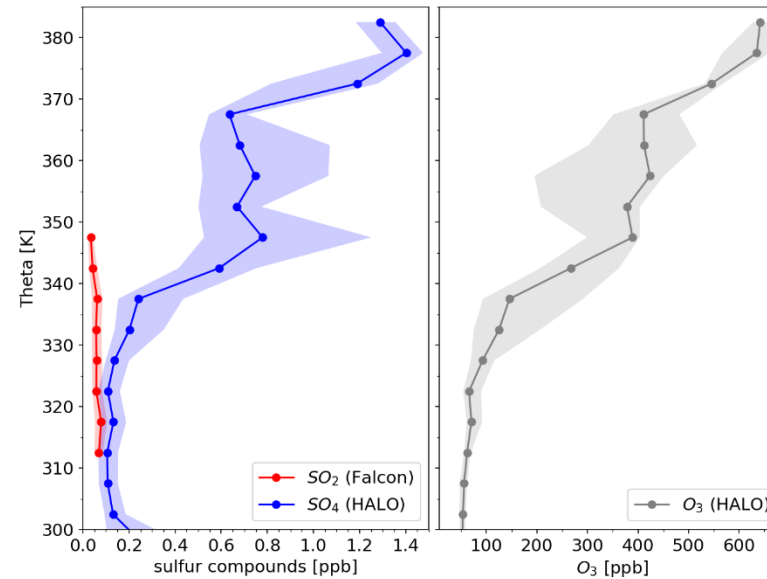
SO₂ Profile in UTLS

- SO₂ reduced in comparison to North Atlantic flight corridor
- Reduced air traffic



Stratospheric aerosol layer

- SO₂ is precursor for secondary SO₄ aerosol
- Enhanced SO₄ in the stratosphere
- Volcano Raikoke in Japan erupted in June 2019
 - plume height reaching into the stratosphere
 - Injected SO₂ mass around 1.35 Tg (Kloss et al., 2021)
 - OMPS AOD enhanced 1 year after eruption (Kloss et al., 2021)



https://eoimages.gsfc.nasa.gov/images/imagerecords/145000/145226/iss059e119250_lrg.jpg

References Arnold et al. (1997), Observation of upper tropospheric sulfur dioxide- and acetone-pollution: Potential implications for hydroxyl radical and aerosol formation. *Geophysical research letters*, 24(1), 57-60. Jurkat et al. (2010), Airborne stratospheric ITCIMS measurements of SO₂, HCl, and HNO₃ in the aged plume of volcano Kasatochi. *J. Geophys. Res.*, 115, D00L17, doi:10.1029/2010JD013890. Kloss et al. (2021), Stratospheric aerosol layer perturbation caused by the 2019 Raikoke and Ulawun eruptions and their radiative forcing. *Atmospheric Chemistry and Physics*, 21(1), 535-560. Speidel et al. (2007), Sulfur dioxide measurements in the lower, middle and upper troposphere: Deployment of an aircraft-based chemical ionization mass spectrometer with permanent in-flight calibration. *Atmospheric Environment*, 41(11), 2427-2437. Williamson et al. (2021), Large hemispheric difference in ultrafine aerosol concentrations in the lowermost stratosphere at mid and high latitudes. *Atmospheric Chemistry and Physics Discussions*, 1-44.

