Abstract Information

Abstract Title	Satellite Validation of TROPOMI-SO2 over the Balkan Region by Airborne SO2 Measurements of Coal-Fired Power Plants

Abstract

The first airborne in situ measurements of sulphur dioxide (SO2) emissions (plumes) from two coal-fired power plants in Bosnia-Herzegovina (Tuzla) and Serbia (Nikola Tesla) were carried out with the German research aircraft Falcon-20 in cooperation with local partners during the METHANE-To-Go field experiment in autumn 2020. Downwind of the power plants, SO2 mixing ratios exceeding 100 ppb were measured in a distance ~20-40 km from the sources. The plumes were trapped in well-defined inversion layers between ~500-1000 m altitude. Our airborne measurements can be used to validate synchronously, spaceborne SO2 measurements from the TROPOspheric Monitoring Instrument (TROPOMI) onboard the Sentinel-5P satellite. A first intercomparison indicates some problems with dense smoke clouds frequently covering these countries in winter. However, one part of the Nikola Tesla flight is well suited for TROPOMI-SO2 validation, since it was obtained during cloud-free conditions with a well-defined vertical extension of the probed SO2 plume (needed to estimate the Vertical Column Density, VCD). These airborne measurements and model simulations can also be used to determine the SO2 emission strength of the power plants. First estimates (mass balance approach) show that the SO2 mass flux from Tuzla is about twice as high as indicated by common emission inventories.