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Investigation on flight level contamination using volcanic SO_2 plume and cloud top height satellite products

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Volcanic emission is a major risk for air traffic. Flying through a volcanic cloud can have a strong impact on engines (damage caused by ash and/or sulphur dioxide – SO_2) and persons. The knowledge of the height of the volcanic plume is indeed essential for pilots, airlines and passengers.

In this presentation, we study recent volcanic emissions to illustrate the difficulty for obtaining information about the height of the SO_2 plume in a form relevant to aviation. Our study uses satellite data products. We consider SO_2 layer height from TROPOMI (UV-vis hyperspectral sensor on board S5P, a polar orbiting platform), as shown by SACS (Support to Aviation Control Service), combined with cloud top observations (from the same sensors or from geostationary broadband imagers) to determine the minimum SO_2-cloud height. This is a validation which is of interest to aviation.

The flight level, not the km, is the measure, the unit for expressing height during cruise flight used on board by the pilots to ensure safe vertical separation between aircraft, despite natural local variations in atmospheric air pressure and temperature. Thus, it is critical to provide the corresponding SO_2 contamination expressed as flight levels. Our study will focus on this conversion that is one item currently being developed in the frame of ALARM H2020 project (https://alarm-project.eu) and SACS early warning system (https://sacs.aeronomie.be) in the creation of NetCDF alert products.