Monitoring of sulphur dioxide emissions from satellite as part of GSE PROMOTE

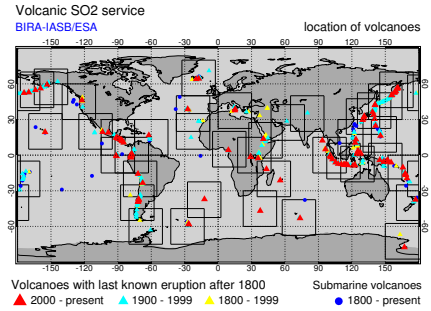
Sulphur dioxide (SO_2) enters the atmosphere as a results of both natural phenomena and anthropogenic activities, such as fossil fuel combustion, oxidation of organic materials in soils, volcanic eruptions and biomass burning. Changes in the abundance of SO_2 have an impact on atmospheric chemistry and on the radiation field, and hence on the climate. Effects of volcanic eruptions may have an impact on air traffic, as such eruptions are important sources of ash (aerosols) and SO_2. Consequently, global observations of SO_2 are important for atmospheric and climate research and for air traffic organisations.

Monitoring of SO_2 concentrations is done on the basis of UV-Visible measurements by satellite based instruments, such as GOME, SCIAMACHY and OMI. In view of the main sources of SO_2, the monitoring is divided in two services:

- The Volcanic SO_2 Service concentrates on regions with volcanoes known to have erupted after 1800, as part of the baseline service Support to Aviation Control of PROMOTE stage II.
- The Air Quality SO_2 Service concentrates on industrialised areas, as part the baseline service Air Quality Records of PROMOTE stage II.

Volcanic SO_2 Service

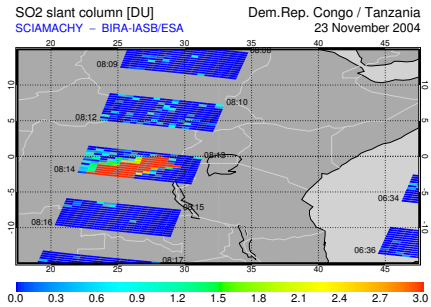
The Service focuses on a set of 41 geographic regions of 30 by 30 degrees covering volcanoes known to have erupted after the year 1800.



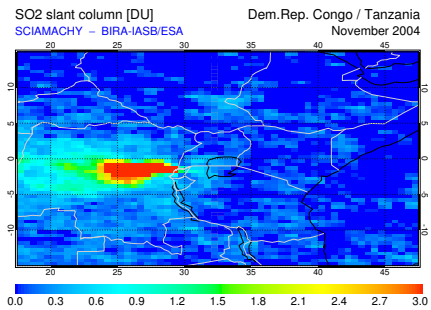
Data and images will be provided in the form of a Near-Real-Time and an Archive Service.

http://www.temis.nl/aviation/so2.php

For the NRT Service, images and data of the SO_2 slant column or an SO_2 index will be provided on a daily basis at satellite orbit coordinates, alongside with cloud cover information.



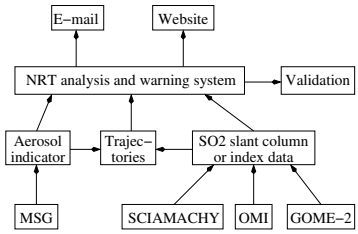
For the Archive Service, images and data will be provided at satellite orbit coordinates (daily data) and at a longitude-latitude grid (daily data, 3-day composites, monthly averages).



Support to Aviation Control

The Service will focus on the timely delivery of SO_2 data and images to a website. The Service will comprise SO_2 slant columns derived with a DOAS technique from measurements by SCIAMACHY and GOME-2, as well as an SO_2 index derived from OMI measurements. This will allow for monitoring the occurrence and extension of volcanic eruptions and plumes.

In addition to this data, high-resolution images (about 3 km, depending on latitude) taken with a 15 min scan cycle by SEVIRI/MSG of Europe and Africa, will provide information to trace and track volcanic ash plumes by way of a volcanic aerosol indicator.



The Service will send warnings of exceptional SO_2 missions by e-mail to interested parties, with a reference to specific pages at the website.

By combining observations of SO_2 and aerosols with meteorological forecast data, trajectories of volcanic plumes can be traced back to the origin of the emission and used to forecast the motion up to 3 days in advance.

Users of the Service

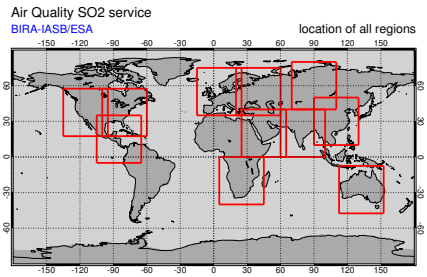
The service is primarily designed to support activities of the European Volcanic Ash Advisory Centres (VAAC) in Toulouse and London. To benefit future users and the general public, as well as for validation tasks, the Service focuses on geographic regions covering the volcanoes known to have erupted after the year 1800.

Service Partners

BIRA-IASB – Jos van Geffen (service leader), Michel Van Roozendael
CGS – Walter Di Nicolantonio
DLR – Pieter Valks, Thilo Erbetseder
KNMI – Ronald van der A

Air Quality SO_2 Service

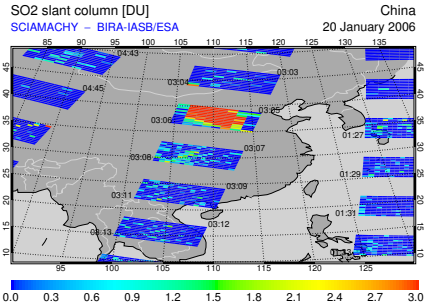
The Service focuses on a set of 12 geographic regions of 40 by 40 degrees covering industrialised areas.



Data and images will be provided in the form of a Near-Real-Time and an Archive Service.

http://www.temis.nl/airpollution/so2.php

For the NRT Service, images and data of the SO_2 slant column or an SO_2 index will be provided on a daily basis at satellite orbit coordinates, alongside with cloud cover information.



For the Archive Service, images and data will be provided at satellite orbit coordinates (daily data) and at a longitude-latitude grid (daily data, 3-day composites, monthly averages).