



## **The Satellite based Monitoring Initiative for Regional Air quality (SAMIRA): Project summary and first results**

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We present a summary and some first results of a new ESA-funded project entitled Satellite based Monitoring Initiative for Regional Air quality (SAMIRA), which aims at improving regional and local air quality monitoring through synergetic use of data from present and upcoming satellite instruments, traditionally used in situ air quality monitoring networks and output from chemical transport models. Through collaborative efforts in four countries, namely Romania, Poland, the Czech Republic and Norway, all with existing air quality problems, SAMIRA intends to support the involved institutions and associated users in their national monitoring and reporting mandates as well as to generate novel research in this area.

The primary goal of SAMIRA is to demonstrate the usefulness of existing and future satellite products of air quality for improving monitoring and mapping of air pollution at the regional scale. A total of six core activities are being carried out in order to achieve this goal: Firstly, the project is developing and optimizing algorithms for the retrieval of hourly aerosol optical depth (AOD) maps from the Spinning Enhanced Visible and InfraRed Imager (SEVIRI) onboard of Meteosat Second Generation. As a second activity, SAMIRA aims to derive particulate matter (PM<sub>2.5</sub>) estimates from AOD data by developing robust algorithms for AOD-to-PM conversion with the support from model- and Lidar data. In a third activity, we evaluate the added value of satellite products of atmospheric composition for operational European-scale air quality mapping using geostatistics and auxiliary datasets. The additional benefit of satellite-based monitoring over existing monitoring techniques (in situ, models) is tested by combining these datasets using geostatistical methods and demonstrated for nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), and aerosol optical depth/particulate matter. As a fourth activity, the project is developing novel algorithms for downscaling coarse-resolution satellite products of air quality with the help of high-resolution model information. This will add value to existing earth observation products of air quality by bringing them to spatial scales that are more in line with what is generally required for studying urban and regional scale air quality. In a fifth activity, we implement robust and independent validation schemes for evaluating the quality of the generated products. Finally, in a sixth activity the consortium is working towards a pre-operational system for improved PM forecasts using observational (in situ and satellite) data assimilation.

SAMIRA aims to maximize project benefits by liaison with national and regional environmental protection agencies and health institutions, as well as related ESA and European initiatives such as the Copernicus Atmosphere Monitoring Service (CAMS).