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SAMIRA - SAtellite based Monitoring Initiative for Regional Air quality

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Here, we present 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 satellites, 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.

Despite considerable improvements in the past decades, Europe is still far from achieving levels of air quality that do not pose unacceptable hazards to humans and the environment. Main concerns in Europe are exceedances of particulate matter (PM), ground-level ozone, benzo(a)pyrene (BaP) and nitrogen dioxide (NO_2). While overall sulfur dioxide (SO_2) emissions have decreased in recent years, regional concentrations can still be high in some areas.

The objectives of SAMIRA are to improve algorithms for the retrieval of hourly aerosol optical depth (AOD) maps from SEVIRI, and to develop robust methods for deriving column- and near-surface PM maps for the study area by combining satellite AOD with information from regional models. The benefit to existing monitoring networks (in situ, models, satellite) by combining these datasets using data fusion methods will be tested for satellite-based NO_2, SO_2, and PM/AOD. Furthermore, SAMIRA will test and apply techniques for downscaling air quality-related EO products to a spatial resolution that is more in line with what is generally required for studying urban and regional scale air quality.

This will be demonstrated for a set of study sites that include the capitals of the four countries and the highly polluted areas along the border of Poland and the Czech Republic, and the Gorj County in Romania. All data products shall undergo a quality control, i.e. robust and independent validation. The SAMIRA consortium will further work towards a pre-operational system for improved PM10 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 Atmospheric Monitoring Services (CAMS).