A novel approach to synergistic exploitation of atmospheric Sentinels data

C. Tirelli [1], S. Ceccherini [1], U. Cortesi [1], S. Del Bianco [1], M. Gai [1]

[1] Institute for Applied Physics "Nello Carrara" (IFAC-CNR)

AURORA (Advanced Ultraviolet Radiation and Ozone Retrieval for Applications) is a three-year project supported by the European Union in the frame of its H2020 Call (EO-2-2015) for "Stimulating wider research use of Copernicus Sentinel Data". The primary goal of the project is to exploit the complementary measurement capabilities of the instruments on board the Sentinel-4 and Sentinel-5 missions of the Copernicus programme, operating on sun-synchronous polar Low Earth Orbit (LEO) and on Geostationary orbit (GEO) respectively, for near real-time monitoring of the ozone vertical profile with unprecedented accuracy. The project data cover the lower layers of the atmosphere over Europe, North Africa and the Middle East, where ozone acts as a pollutant and as a greenhouse gas.

In the framework of AURORA project, innovative scientific approaches and technological solutions will be applied to derive a unique geophysical product from the operational ozone data retrieved from independent datasets simultaneously acquired by observing the same air masses in different spectral regions (Ultraviolet, Visible, and Thermal Infrared) and in different viewing geometries. In remote sensing observations, two strategies are possible for the retrieval of the best vertical profile estimate that exploits all the available information from two or more instruments that observe the same portion of the atmosphere: the simultaneous retrieval and the data fusion. In the data fusion approach independent vertical profiles are retrieved from the observations of each instrument and subsequently combined through a specific algorithm into a single estimate. In the project, the data fusion approach is used to combine the information associated to the operational products of the LEO instruments, as well as to the ones on the GEO mission. The fused ozone profiles resulting from this first step will be subsequently merged into assimilation models, to integrate the combined products from LEO and GEO measurements in a short-term ozone forecasting model. A technological infrastructure, based on virtual machines, cloud data sharing, a geo-database, and web-services for data access, will be developed to implement the full AURORA data processing chain and it will play a key role in ensuring wider use of Copernicus Sentinel data for academia, public agencies and industry. As part of the project primary goals, two applications will be developed based on the advanced products resulting from the AURORA data processing chain: the first one associated to air quality monitoring and exploiting the tropospheric ozone column products, the second one improving current applications for personal photoprotection and exploiting the UV surface radiation product.

This poster offers an introduction to the scope and objectives of the AURORA project as well as to its scientific, technological and application-oriented concepts. In particular, the scientific aspect of the data fusion will be treated here and the new data fusion technique used in the project will be illustrated in some details.