



Air quality remote sensing over alpine regions with METEOSAT SEVIRI

E. Emili (1,2), C. Popp (1,2), M. Petitta (2), M. Riffler (1), and S. Wunderle (1)

(1) Institute of Geography, University of Bern, Switzerland, (2) Institute for Applied Remote Sensing, European Academy (EURAC), Bolzano, Italy

It is well demonstrated that small aerosol particles or particulate matter (PM₁₀ and PM_{2.5}) affect air quality and can have severe effects on human's health. Hence, it is of great interest for public institutions to have an efficient PM monitoring network. In the last decades this data has been provided from ground-based instruments. Moreover, due to the fast development of space-borne remote sensing instruments, we can now be able to take advantage of air pollution measurements from space, which bears the potential to fill up the gap of spatial coverage from ground-based networks. This also improves the capability to assess air pollutants transport properties together with a better implementation in forecasting data assimilation procedures.

In this study we examine the possibility of using data from the Spinning Enhanced Visible and Infrared Imager (SEVIRI), on-board of the geostationary Meteosat Second Generation (MSG) platform, to provide PM concentrations values over Switzerland. SEVIRI's high temporal resolution (15 minutes) could be very useful in investigating the daily behaviour of air pollutants and therefore be a good complement to measurements from polar orbiting sensors (e.g. MODIS).

Switzerland is of particular interest because of its mountainous orography that hampers pollutants dispersion. Further, major transalpine connection routes, often characterised by high traffic load, act as a significant air pollution source. The south of Switzerland is also occasionally influenced by pollutants transported from the highly industrialised Po Valley in northern Italy.

We investigate the existence of a linear relation between the SEVIRI retrieved AOD (Aerosol Optical Depth) and the PM concentration obtained from the ground-based air quality network NABEL (Nationales Beobachtungsnetz fuer Luftfremdstoffe). The temporal trend of this two quantities shows a significant relationship over various locations. The correlation coefficient is in some cases higher than 0.6, indicating the possibility of estimating PM concentrations from SEVIRI AOD with a reasonable uncertainty using a statistical empirical linear model. The quality of this approach is highly influenced by the seasonal variability and by the meteorological conditions. We also include meteorological data in order to investigate the observed correlation and to improve the statistical empirical model. Finally, the possible sources of errors for this approach are examined.