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Real time air quality forecasting system for Slovenia based on an online coupled WRF/Chem model

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In recent years extensive efforts have been devoted to develop real-time air quality forecasting (RT-AQF) systems for topographically complex and geographically diverse area of Slovenia. The experimental weather and air quality (AQ) forecast based on an on-line coupled WRF/Chem model (Grell et al., 2005) has been now running operationally on a high resolution over Slovenia (http://meteo.fmf.uni-lj.si/onesnazenje). ALADIN/CAMx off-line coupled AQ forecasting system has been set-up for operational forecast at Environment Agency of Slovenia, as well as a statistical ozone model has been developed and presents a basis for the official two-day ozone forecast made available to the public by Slovenian Environment Agency.

In this contribution we focus on the use of the state-of-the-science WRF/Chem model with coupled meteorological, microphysical, chemical, and radiative processes for forecasting weather and AQ over Slovenia during summertime conditions. Due to the limited number of previous studies focused on on-line coupled forecasting systems, the aim of our contribution is to provide a greater insight into potential that lies in the approach based on an unified model for forecasting weather and air pollution. We evaluate 1-day and 2-day WRF/Chem meteorological and AQ forecast, and in the case of ozone compare the predictions also with persistence and with statistical model available at Slovenian Environment Agency. Furthermore, since current operational WRF/Chem model configuration takes into account aerosol direct effects, we evaluate the impact of aerosols through the changes in radiation processes on predicted meteorological variables, including temperature, boundary layer height, clouds, etc. An additional pure meteorological WRF forecast with otherwise identical configuration has been conducted to enable these evaluations. Finally, strengths, limitations and deficiencies of analyzed on-line coupled RT-AQF system are identified and present the basis for further scientific research.