Initial results of the project SINOPTICA (Satellite-borne and IN-situ Observations to Predict The Initiation of Convection for ATM)

Laura Esbri[1], Maria Carmen Llasat[1], Tomeu Rigo[2], Massimo Mielli[3], Vincenzo Mazzarella[3], Martina Lagasio[3], Andrea Parodi[3], Marco-Michael Temme[4], Olga Glushenko[4], Markus Kerschbaum[5], Riccardo Biondi[6], Nicola Surian[6], Eugenio Realini[7], Andrea Gatti[7], and Giulio Tagliaferro[7]

[1]Department of Applied Physics, University of Barcelona, Spain (lesbri@meteo.ub.edu)

[2]Meteorological Service of Catalonia, Barcelona, Spain

[3]CIMA Research Foundation, Savona, Italy

[4]Institute of Flight Guidance, German Aerospace Center (DLR), Braunschweig, Germany

[5]Austro Control GmbH, Wien, Austria

[6]Geosciences Department, University of Padua, Padua, Italy

[7]Geomatics Research & Development Srl, Como, Italy

In the framework of the SINOPTICA project (EU H2020 SESAR, 2020 – 2022), different meteorological forecasting techniques are being tested to better nowcast severe weather events affecting Air Traffic Management (ATM) operations. Short-range severe weather forecasts with very high spatial resolution will be obtained starting from radar images, through an application of nowcasting techniques combined with Numerical Weather Prediction (NWP) model with data assimilation. The final goal is to integrate compact nowcast information into an Arrival Manager to support Air Traffic Controllers (ATCO) when sequencing and guiding approaching aircraft even in adverse weather situations. The guidance-support system will enable the visualization of dynamic weather information on the radar display of the controller, and the 4D-trajectory calculation for diversion coordination around severe weather areas. This meteorological information must be compact and concise to not interfere with other relevant information on the radar display of the controller.

Three severe weather events impacting different Italian airports have been selected for a preliminary radar analysis. Some products are considered for obtaining the best radar approach to characterize the severity of the events for ATM interests. Combining the Vertical Integrated Liquid and the Echo Top Maximum products, hazard thresholds are defined for different domains around the airports. The Weather Research and Forecasting (WRF) model has been used to simulate the formation and development of the aforementioned convective events. In order to produce a more accurate very short-term weather forecast (nowcasting), remote sensing data (e.g. radar, GNSS) and conventional observation are assimilated by using a cycling three-dimensional variational technique. This contribution presents some preliminary results on the progress of the project.