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The airport-sCAle seveRe weather nowcastinG prOject (CARGO)

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Monitoring and predicting extreme atmospheric events, such as deep convective systems, is very challenging especially when they develop locally in a short time range. Despite the great improvement in model parametrization and the use of satellite measurements, there are still **l**arge uncertainties on the knowledge of the dynamical processes of deep convective systems at local scale.

We use an innovative approach integrating a dense network of in situ measurements and satellite-based observations/products for the improvement of meteorological nowcasting at airport spatial scale focusing on the Malpensa airport (Italy). We add to the standard atmospheric parameters analysis, the information of integrated water vapour and lightning spatio-temporal behaviour (potential heavy rain precursors) during heavy rain phenomena detected by meteorological radars. The study is based on the anomaly of each atmospheric parameter during a convective event in comparison to its climatology in non-pre-convective environment, so that we are able to detect the variation with respect to the "standard" conditions. The ground based GNSS receivers (allowing the determination of the integrated water vapour trend before and during the storm), together with the lightning detectors, the weather stations (providing the trend of temperature, humidity and wind fields), the radiosondes and the GNSS radio occultations (allowing the estimation of vertical profiles of temperature, pressure and humidity) provide information on the pre-convective and non-pre-convective environment as a 3D picture of the atmospheric conditions.

The final goal is the test of a severe weather events nowcasting algorithm with high spatial resolution, and based on neural networks, for improving aviation safety. This is followed by the development of a user-friendly tailored final product, easily understandable by the Air Traffic Management stakeholder.

We have collected more than 600 cases suitable to develop the neural network algorithm. We show here the algorithm implementation and the meteorological characterization of deep convection usually developing on the Malpensa airport area.