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Simulating high-resolution surface winds around the Incheon International Airport of Korea

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The mass-consistent wind field model (MCWFM) is applied to produce diagnostic surface wind flow at high spatial resolution of 100 m around the Incheon International Airport (IIA), Korea. Based on the 5-m resolution topography of the Digital Elevation Model (DEM) data, the model-simulated winds obtained by adjusting both of the analysis filed data of the Korea Meteorological Administration's (KMA) regional operational model and wind observations for the strong-wind watch event issued at the airport during 3-5 of May, 2016.
Winds simulations from both of MCWFM and the operational model only compared to the surface wind measurements at the airport. The results show that winds computed from MCWFM are more realistic flow patterns around the hills, and well matched to Automated Weather Station (AWS) wind measurements at the airport site for whole event period. Furthermore, simulated speeds without one wind measurement (LLWAS site number 8) in MCWFM have mean value of 7.9 m/s which is similar to observed mean of 8.4 m/s, and are reproduced with 96.2 % of measured values of the excluded LLWAS station in the airport. These results suggest that MCWFM approach could be very useful for simulating wind flow in the runway in support of wind hazardous management in airports. Further case studies in strong wind occurrences followed by various synoptic situations and seasons would be useful in improving the model accuracy.