EMS Annual Meeting Abstracts
Vol. 10, EMS2013-16, 2013
13th EMS / 11th ECAM

The climatology of atmospheric icing severity using a hybrid approach: Reanalysis and GEM-LAM 5km

F. Lamraoui (1), G. Fortin (2), R. Benoit (3), J. Perron (1), and C. Masson (3)

(1) Anti-icing Materials International Laboratory - Chicoutimi - Canada, (2) Bombardier Aerospace - Montreal – Canada , (3) École de Technologie Supérieure - Montreal - Canada

Atmospheric icing, depending on its severity, can become a serious hazard for numerous vulnerable structures, which in turn can also pose an economical and public safety threat. High potentials of wind correspond to high occurrences of atmospheric icing. This fact brings about considerable challenges to the wind industry located in cold climate regions. This study aims to represents high resolution climatology of atmospheric icing covering the north-east of Quebec (Canada), by providing a mapping of the icing severity index over 32 years (1979-2010) during winter months. Two case studies involving topographically contrasting sites in Canada were selected: a simple terrain site - the airport of Bagotville and a complex terrain site - Mt Bélair. Ice accumulation was quantified by using ice accretion on a cylinder model. A hybrid approach is applied to reach an optimal compromise between high resolution icing events details and time consuming calculations. This approach involves the combination between Reanalysis and the mesoscale limited area model GEM-LAM. In order to identify the significant icing events, a preliminary climatology of the in-cloud icing is produced based on reanalysis (32km). Subsequently, a higher resolution (5km) calculation of icing events is realized, using GEM-LAM-5km only during the pronounced icing events. The final climatology is a combination of the high resolution events and the baseline reanalysis for the entire 32-year period. This study concludes that the use of reanalysis alone poses a challenge on the icing calculations over complex terrains, particularly when air temperature is near freezing point. The results obtained for the icing severity index identify localized details of the climatology of icing events within a long period of time. This study concludes that the icing severity index proved to be a reliable indicator of risk levels of icing events due to in-cloud icing and by extension freezing rain events.